

## **NICE RAPID REVIEW**

### **Interventions to Improve Partner Support and Partner Cessation During Pregnancy**

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# 1. EXECUTIVE SUMMARY

## *Introduction and Aims*

Statistics show that 32% of UK mothers smoke during pregnancy, and 30% of those who quit during pregnancy relapse within one year postpartum. Second hand smoke exposure of UK children is estimated at 50%. Tobacco use by expecting and new mothers can have serious health consequences for the woman and her pregnancy, her partner, and her children.

A partner's smoking status and support for the pregnant/postpartum woman's efforts to reduce or quit smoking may impact her ability to change her smoking behaviour. In addition, pregnancy is a key time to address partner smoking, both for their own health and that of the fetus and children.

This report contains a systematic literature review of interventions to enhance partner support for pregnant and postpartum women's smoking reduction or cessation, and cessation treatments for the partners themselves.

## *Methods*

To address this issue, the Information Collaboration Centre provided 855 unique references which, after being examined for relevancy, yielded 9 intervention studies and 9 background articles. Background articles offered substantive information pertinent to the research questions. All articles were appraised for quality, and the nine intervention studies are summarized in Evidence Tables, and presented in a narrative analysis which is summarized below.

The two primary questions addressed in this report are:

1. Which interventions are effective in encouraging partners or significant others to support smoking cessation during pregnancy and following childbirth?
2. Which interventions are effective in encouraging partners or significant others who smoke to stop smoking?

Sub-questions address the effectiveness of intervention delivery, providers, site, and intensity; effectiveness by age, gender, ethnicity, and socioeconomic status; and the facilitators and barriers to implementation.

The goals of the interventions are (1) to increase partner support provided to the pregnant/postpartum woman to encourage her to quit or reduce smoking, (2) reduce the smoking prevalence among pregnant/postpartum women and their partners, (3) increase the number of partners reducing or quitting, and (4) make positive changes in partner's attitudes and knowledge regarding smoking.

## **Main Findings**

For the first question, 7 studies addressed whether or not an intervention was effective in encouraging partners to support smoking cessation during pregnancy and postpartum. However, only one Dutch randomized control trial showed significant results for an intervention which included a partner-targeted component. In this intervention, pregnant women received a health counseling session, along with video and print-based information resources, while partners received a booklet explaining the importance of quitting smoking together. However, it is unclear what impact the partner-booklet had on pregnant women's smoking cessation, since less than half of partners reported reading the booklet.

For the question on partner cessation, there is moderate evidence that multi-component interventions that include free nicotine replacement therapies are effective in encouraging partners who smoke to stop smoking. Two randomized control trials from the US and Australia had free NRT patches, telephone counseling, and multiple contacts as components of effective interventions for male partners, but the impact of treatment on overall quit rates may not be sustainable post-partum.

None of the studies included significant others (ie. friends, room-mates, other family members, etc), or women partners. Rather, all of the studies included focused on the expecting father.

The evaluation of the sub-questions found the following:

*How does the way that the intervention is delivered influence effectiveness?*

- Delivering free nicotine replacement therapy with intensive interventions showed a significant effect in one Australia-based RCT.

*Does effectiveness depend on the status of the person delivering it?*

- Three studies with significant effects were delivered by highly trained medical personnel.

*Does the site/setting influence effectiveness?*

- A home based intervention showed significant results in one Australian-based RCT study.

*Does the intensity of the intervention influence effectiveness or duration of effect?*

- There is inconsistent evidence that the intensity of an intervention influences its effectiveness.

*How does effectiveness vary according to the age, sex, socio-economic status or ethnicity of the target audience?*

- Three studies examined whether or not the socioeconomic status of participants impacted the effectiveness of the intervention. Participants with lower education and income exhibited higher intervention dropout. In addition, men with a skilled job showed a higher quit rate, more quit attempts and (for those who continue to smoke) smoked their first cigarette of the day later than unskilled workers.

*What are the facilitators and barriers to implementation?*

- The lack of follow-up in an intervention is a barrier to effectiveness as one-time treatments were ineffective in 5 separate studies. Another barrier to treatment implementation is the unsustainable (ie. no significant effect reported at follow-up time period) impact on treatment: in the 3 RCTs where effectiveness was demonstrated. These interventions did not measure effectiveness at postpartum, or did not report significant effects at postpartum.
- There is moderate evidence that interventions that use videos and NRTs may be more effective. Interventions with significant results used videos in 2 RCT trials, and free NRT for partners in 2 RCT studies.

*Applicability to the UK context:*

- All but two of the studies reviewed were outside of the UK. The demographics of participants in Australian, Dutch, Norwegian, Chinese, Swedish and US studies may differ from the demographics of English women and men. As a result, it is not clear whether or not these findings are directly applicable to the UK.

## **Conclusions**

While there was evidence on partner support and partner smoking in smoking cessation interventions during pregnancy, few intervention studies actually demonstrated significant results in either encouraging partners to support smoking cessation during pregnancy and postpartum, or a significant effect on partner's smoking cessation/ quit attempts. These findings demonstrate that there are very few effective smoking cessation interventions for pregnant/postpartum women that include partners or target partner smoking behaviours. The lack of effective interventions for addressing partner support for smoking cessation and partner smoking during pregnancy suggests the need for further research in this area.

## **Evidence Statements**

### **1. Which interventions are effective in encouraging partners and significant others to support smoking cessation during pregnancy and following childbirth?**

#### **Evidence Statement No. 1**

There is limited evidence on which interventions are effective in encouraging partners to support smoking cessation during pregnancy and postpartum. Seven of the intervention studies addressed partner support of women's cessation.<sup>1-7</sup> Studies that reported non-significant outcomes used workbooks (+)<sup>2</sup>, counseling (+ and -)<sup>5,6</sup>, a media education campaign<sup>3</sup>, or biofeedback methods<sup>4,7</sup>. The one study that reported significant outcomes was a (+) Dutch randomized control trial,<sup>1</sup> targeting the partner to encourage smoking cessation during pregnancy. In this intervention, pregnant women received health counseling along with video and print resources on smoking cessation, while partners received a booklet explaining that quitting together is important for the health of the baby. However, it is unclear what impact the partner-booklet had on pregnant women's smoking cessation, since 76.2% of the women reported delivering the booklet to their partner, and only 48.5% of partners reported reading the booklet.

1. DeVries, Bakker et al. 2006, Netherlands (+)
2. Aveyard, Lawrence et al. 2005, UK (+)
3. Campion, Owen et al. 1994, UK (+)
4. Eurenus, Axelsson et al. 1996, Sweden (-)
5. McBride, Baucom et al. 2004, US (+)
6. Oien, Storro et al. 2008, Norway (-)
7. Wakefield and Jones 1998, Australia (+)

Applicability: The one study with significant outcomes took place outside of the UK. Therefore, findings may not be directly relevant to the UK.

### **2. Which interventions are effective in encouraging partners and significant others who smoke to stop smoking?**

#### **Evidence Statement No. 2**

There is moderate evidence that multi-component interventions that include free nicotine replacement therapies are effective in encouraging partners who smoke to stop smoking. Nine studies examined whether specific interventions were effective in encouraging partners and significant others who smoke to stop smoking.<sup>1-8</sup> Interventions that had non-significant outcomes include: a media education campaign(+)<sup>3</sup>, partner delivered booklet (+ and -)<sup>4,6</sup>, counseling (+)<sup>8</sup>, biofeedback-based interventions (+ and -),<sup>5,8</sup> and self-help guidance (+).<sup>9</sup>

Two randomized control trials from the US and Australia [one +, one [++]<sup>1,2</sup> had significant outcomes. These interventions offered free NRT patches to partners, in conjunction with smoking cessation resources and multiple telephone counseling sessions which encouraged partner support<sup>1</sup>, or along with a minimal intervention which included video and print materials on smoking cessation and multiple contacts to address male partner's smoking<sup>2</sup>. However, the effect of treatment on overall quit rates was not sustained at follow-up periods.

1. McBride, Baucom et al. 2004, US (+)
2. Stanton, Lowe et al. 2004, Australia (++)
3. Champion, Owen et al. 1995, UK (+)
4. Devries, Bakker et al. 2006, Netherlands (+)
5. Eurenus, Axelsson et al. 1996, Sweden (-)
6. Loke and Lam 2005, China (-)
7. Oien, Storro et al. 2008, Norway (-)
8. Wakefield and Jones 1998, Australia (+)
9. Aveyard, Lawrence et al., 2005, UK (+)

Applicability: Both studies with significant findings took place outside of the UK. Therefore, findings may not be directly relevant to the UK.

### **3. How does the way the intervention is delivered influence effectiveness?**

#### **Evidence Statement No. 3**

There is limited evidence that the method of delivery influences the effectiveness of interventions targeting partners and significant others in supporting smoking cessation during pregnancy and following childbirth. Biofeedback approaches, such as using a demonstration of the health of the fetus with an ultrasound<sup>2</sup> or a model of fetal heart rate<sup>1</sup> did not show any significant results in two before and after studies conducted in Australia (+)<sup>1</sup> and Sweden (-)<sup>2</sup>. Furthermore, relying on the woman to provide the intervention materials to her partner also had no significant effect on smoking outcomes in two RCT studies in the Netherlands (+)<sup>3</sup> and China (-)<sup>4</sup>. Providing free nicotine replacement therapy and having intensive interventions, showed a significant effect on smoking outcomes in one Australia-based (++) RCT<sup>5</sup>.

1. Wakefield and Jones 1998, Australia (+)
2. Eurenus, Axelsson et al. 1996, Sweden (-)
3. Devries, Bakker et al. 2006, Netherlands (+)
4. Loke and Lam 2005, China (-)
5. Stanton, Lowe et al. 2004, Australia (++)

Applicability: All studies were conducted outside of the UK. Therefore, findings may not be directly relevant to the UK.



#### **4. Does effectiveness depend on the status of the person delivering it?**

##### **Evidence Statement No. 4**

While no studies specifically examined whether the status of the person delivering an intervention influences effectiveness, the three studies that demonstrated significant effects (out of the nine studies reviewed) were delivered by highly trained medical personnel. Effective interventions in three RCTs [one ++ and two +] conducted in the US,<sup>1</sup> Australia,<sup>2</sup> and the Netherlands<sup>3</sup> utilized highly trained medical personnel to deliver interventions (including graduate-level educated counselors, general practitioners and midwives), but in two of the studies there was either no significant effect of the intervention on smoking cessation outcome<sup>1</sup> or effectiveness was not measured<sup>2</sup> at postpartum.

However, because these studies did not examine the impact of the status of the person delivering the intervention on its effectiveness, further research is required and recommended to answer this question.

1. McBride, Baucom et al. 2004, US (+)
2. Stanton, Lowe et al. 2004, Australia (++)
3. DeVries, Bakker et al. 2008, Netherlands (+)

Applicability: All studies were conducted outside of the UK. Therefore, findings may not be directly relevant to the UK.

#### **5. Does the site/setting influence effectiveness?**

##### **Evidence Statement No. 5**

While no studies specifically examined the effects of the site/setting of the intervention, one study provides some relevant evidence related to the site of an intervention and another intervention took into consideration the setting (context). In particular, significant results were obtained in one (++) Australian-based RCT study<sup>1</sup> in which the intervention was performed in participants' homes. In addition, one (-) RCT study based in China included only literate participants, which may not be applicable to the Chinese context, where illiteracy rates are high.<sup>2</sup>

1. Stanton, Lowe et al. 2004, Australia (++)
2. Loke and Lam 2005, China (-)

Applicability: Studies were conducted in Australia and China. Therefore, findings may not be directly relevant to the UK.

## **6. Does the intensity of the intervention influence effectiveness or duration of effect?**

### **Evidence Statement No. 6**

There is inconsistent evidence whether or not the intensity of the intervention influences its effectiveness. Direct and repeated contact was a component of interventions in 3 RCT studies [one ++, two +] conducted in the US, Australia and the Netherlands, which resulted in significant cessation effect with partners<sup>1,2</sup> and with pregnant women.<sup>3</sup> However, repeated contacts in 1 US-based RCT [+] and 1 Norwegian before and after study [-] did not result in significant increases in cessation for pregnant women<sup>1</sup> or pregnant women and their partners<sup>4</sup>.

1. McBride, Baucom et al. 2004, US (+)
2. Stanton, Lowe et al. 2004, Australia (++)
3. DeVries, Bakker et al. 2006, Netherlands, (+)
4. Oien, Storro et al. 2008, Norway (-)

Applicability: Studies were conducted outside of the UK, and therefore may not be directly relevant to the UK.

## **7. How does effectiveness vary according to the age, sex, socio-economic status or ethnicity of the target audience?**

### **Evidence Statement No. 7**

There is strong evidence that effectiveness of an intervention may be influenced by the socioeconomic status of the target audience. Evidence from two (+) RCT studies, demonstrates that dropouts are significantly higher among those participants with lower education and income<sup>1,2</sup>. One (++) RCT study targeting male partners revealed that men with a skilled job exhibited a higher quit rate, more quit attempts and (for those who continue to smoke) smoked their first cigarette of the day later than unskilled workers<sup>3</sup>. One [+] before and after study described a mass media campaign targeted to young, low and middle income pregnant women<sup>4</sup>; however, the intervention yielded no significant changes in smoking prevalence.

There was no available evidence examining the impact of sex or ethnicity.

1. Aveyard, Lawrence et al. 2005, UK (+)
2. McBride, Baucom et al. 2004, US (+)
3. Stanton, Lowe et al. 2004, Australia (++)
4. Campion, Owen et al., 1994, UK (+)

Applicability: Two studies<sup>1,4</sup> were conducted in the UK, and therefore the evidence from these studies is relevant. While the other studies were conducted outside of the UK, the findings support UK-based evidence.

## 8. What are the facilitators and barriers to implementation?

### Evidence Statement No. 8

An important barrier to consider for treatment implementation may be the ineffectiveness of one time treatments. In 3 before and after studies [one -, two +] and 2 RCTs [one +, one -]<sup>1-4</sup> employing one time treatments the interventions were ineffective<sup>1-4</sup>.

There is moderate evidence that another barrier to the implementation of interventions during pregnancy on smoking cessation of partners or pregnant smokers is the lack of a sustained effect of the interventions in the postpartum period. In the 3 RCTs where effectiveness was demonstrated, impact was either not measured or not effective at postpartum [one ++, two +] with significant results<sup>5-8</sup>.

There is moderate evidence that the use of videos and NRTs in interventions may enhance the effectiveness of interventions. In RCT studies, interventions which included videos [one ++, one +]<sup>3,7</sup> and/or NRT for partners [both +]<sup>3,6</sup> reported significant effects.

1. Eurenus, Axelsson et al. 1996, Sweden (-)
2. Wakefield & Jones 1998, Australia (+)
3. Loke & Lam 2005, China (-)
4. Champion, Owen et al. 1994, UK (+)
5. Devries, Bakker et al. 2006, Netherlands (+)
6. McBride, Baucom et al. 2004, US (+)
7. Stanton, Lowe 2004, Australia (++)

Applicability: One study<sup>5</sup> was conducted in the UK, and therefore the evidence from this study is relevant. The other studies were conducted outside of the UK, and therefore may not be directly applicable to the UK-context.

## 2. INTRODUCTION

### 2.1 Context

#### *a) Health Effects*

Statistics from 2005 reveal that 32% of mothers in England smoked during pregnancy, with 49% of those quitting sometime before the birth of the child and 17% continuing to smoke during pregnancy (British Market Research Bureau 2007). However, the relapse rate within one year after birth was 30% (British Market Research Bureau 2007). Furthermore, in one study where biochemical validation was performed, the authors found that women over-report reduction and cessation (Lawrence, Aveyard et al. 2003). NHS smoking cessation services cite smoking cessation in pregnancy as a challenge, and claim that brief interventions alone are ineffective.

Secondhand smoke exposure during pregnancy and postpartum is also a prevalent issue in the UK. In 2005, 38% of mothers in England lived in a home where one or more persons smoked throughout their pregnancy (British Market Research Bureau 2007). This was most commonly the mother's partner. Only 15% of these partners who smoked throughout the pregnancy had stopped smoking between 4 and 10 weeks postpartum; increasing to 24% at 4–10 months postpartum (British Market Research Bureau 2007). Findings suggest that nearly half of all children in the UK are exposed to secondhand smoke in the home (Jarvis, Goddard et al. 2000).

The tobacco use of expecting mothers and fathers has multiple health implications, for the individual smokers, the developing foetus, and the baby or child after birth. Smoking during pregnancy can increase the risk of pregnancy complications and cause serious adverse foetal outcomes including low birth weight, stillbirth, spontaneous abortions, decreased foetal growth, premature births, placental abruption, and sudden infant death syndrome (England, Kendrick et al. 2001; Health Canada 2005; CDC 2006; Mackay, Eriksen et al. 2006). Smoking during pregnancy also poses health risks to the woman. Women who smoke during pregnancy have lower and decreasing folate levels which can alter their nutritional status, and they experience higher rates of miscarriage and reproductive problems (Pagan, Hou et al. 2001).

Pregnant women who do not smoke but have partners who smoke heavily (20 or more cigarettes per day) also face an increased risk of early pregnancy loss (British Medical Association 2004). In addition, male partner's smoking during pregnancy, independent of mother's smoking, has been associated with negative health effects for the newborn or child, including: low birth weight, sudden infant death syndrome, and respiratory and middle-ear diseases (Martinez, Wright et al. 1994; British Medical Association 2004). Finally, pregnant women and partners

who smoke increase their risks of adverse smoking related health outcomes such as lung cancer, respiratory disease, and heart disease.

### *b) Rationale*

The partner's smoking status and support for smoking cessation during pregnancy may be an important factor influencing smoking reduction and cessation among pregnant woman who smoke. Partners who continue to smoke may hinder the pregnant woman's efforts in reducing or quitting smoking (Wakefield, Reid et al. 1998; Bottorff, Oliffe et al. 2006). In addition, partner support offered to the pregnant woman may increase her ability to achieve and maintain cessation.

For example, evidence from one survey of pregnant smokers found that partners who smoked but were also trying to quit were perceived as more supportive than nonsmoking partners (McBride, Baucom et al. 2004). In addition, one cohort study found that women's failure to reduce or quit smoking in early pregnancy was independently associated with the partner's inability to reduce or quit smoking (Appleton and Pharoah 1998). They found that no woman quit when her partner increased smoking, and only one woman kept smoking at the same rate when her partner reduced his smoking. These findings suggest that partner support, partner smoking status, and cessation during pregnancy and postpartum are inter-related.

As Bottorff and colleagues state, "tobacco use behaviour both affects and is affected by others" (Bottorff, Kalaw et al. 2006). However partners often experience less social pressure to quit, both during pregnancy and postpartum, than the pregnant women (Wakefield, Reid et al. 1998). Men report that they are less likely than their pregnant partners to receive advice from health care providers (Wakefield, Reid et al. 1998). Social forces to reduce or quit smoking are typically stronger for the pregnant woman (Ziebland and Fuller 2001). Qualitative research findings often report that men exhibit more reluctance to make changes to their own smoking behaviour, yet will pressure their pregnant partner to reduce or quit smoking (Ziebland and Fuller 2001; Bottorff, Kalaw et al. 2006). Evidence for the effect this has on smoking behaviour comes from a cross-sectional survey conducted in Japan, which revealed lower smoking cessation rates for the partner than for the pregnant woman (Kaneko, Kaneita et al. 2008).

Pregnancy is often framed as a key time to address smoking cessation among women. Yet men with pregnant partners also experience a shift in their relationship towards smoking, with some men spontaneously quitting at the advent of the pregnancy, while others reduce consumption or relocate where they smoke (Bottorff, Radsma et al. 2009). But these shifts are not universal, as some men report that the increased experience of stress during pregnancy

makes quitting more difficult (Wakefield, Reid et al. 1998). However, pregnancy may provide an opportunity to address men's smoking, and positively impact the health of both the man, the pregnant woman, and the foetus (Moffatt and Stanton 2005; Bottorff, Kalaw et al. 2006; Bottorff, Oliffe et al. 2006).

A Cochrane Review, "Enhancing Partner Support to Improve Smoking Cessation [Review]" was conducted in 2004 and updated in 2008. It examines RCT studies of smoking cessation interventions that include a partner component with quit rates measured at 6-9 months and >12 months post-treatment. The review discusses ten articles published between 1981 and 2006, and estimates risk ratios at 6-9 months post-treatment as 1.01 (95% CI, 0.86 to 1.18) and at 12 months it is 1.04 (95% CI, 0.87-1.24). Only two studies reported a significant increase in partner support in the intervention group, and one was McBride, Baucom et al. 2004, which is reviewed in this report. The review failed to detect an increase in quit rates, and therefore could not draw any conclusions about the impact of partner support on smoking cessation. They conclude that the interventions may not have effectively changed the level of partner support, that smoking behaviours are not easily changed by interventions, and/or that partner support results in only short term successes in cessation. Furthermore, this review did not focus specifically on partner support during pregnancy and postpartum. Therefore, other than the article by McBride and colleagues (2004), the other 9 articles included in the Cochrane review do not discuss partner support during pregnancy.

Relatively little research has addressed the smoking status of the partner or the provision of partner support during pregnancy. Rather, cessation interventions for pregnant women tend to focus on the individual woman (Bottorff, Kalaw et al. 2006). Therefore, the role of the partner as a means of support, and the smoking status of the partner in smoking reduction and cessation during pregnancy requires further examination.

### **3. METHODOLOGY**

#### **3.1 Aims and Objectives**

The following review examines:

- 1) Interventions to assist the partners of women who are pregnant, planning a pregnancy or who have recently given birth support the woman in her attempts to quit smoking.

##### Expected outcomes:

- Increased partner support provided to the pregnant woman to encourage her to quit or reduce smoking.
- Reduction in smoking prevalence among pregnant women and their partners.
- Increase in the number of partners reducing or quitting smoking.
- Positive changes in the partner's knowledge and attitudes regarding smoking before, during and after the pregnancy.

- 2) Interventions to help the partners themselves to reduce or quit smoking.

##### Expected outcomes:

- Reduction in the smoking prevalence of the partners of women who are pregnant or have an infant under the age of 12 months.
- Increase in the number of partners who stop smoking.
- Positive changes in their smoking-related knowledge, attitudes and behaviour.

#### **3.2 Research Questions**

There are two primary research questions:

1. Which interventions are effective in encouraging partners to support smoking cessation during pregnancy and following childbirth?
2. Which interventions are effective in encouraging partners who smoke to stop smoking?

The following sub-questions are also discussed:

- i) How does the way that the intervention is delivered influence effectiveness?
- ii) Does effectiveness depend on the status of the person delivering it?
- iii) Does the site/setting influence effectiveness?
- iv) Does the intensity of the intervention influence effectiveness or duration of effect?
- v) How does effectiveness vary according to the age, sex, socio-economic status or ethnicity of the target audience?
- vi) What are the facilitators and barriers to implementation?

### **3.3 Operational Definitions:**

Partners: For the purposes of this review, partners are defined as the expecting fathers.

### **3.4 Inequity Issues:**

Smoking during pregnancy is greater among mothers aged 20 years or younger compared to women who are 35 years and older (45% and 9%) (British Market Research Bureau 2007). In addition, mothers in routine and manual occupations are over four times as likely to smoke during pregnancy – compared to women in managerial and professional occupations (29% and 7%) (British Market Research Bureau 2007). Pregnant women are more likely to smoke if they are less educated, do not own a home, are single or have a partner who smokes. One study that combined deprivation factors to measure the effects of disadvantage on smoking during pregnancy, found that the number of women who continue to smoke throughout pregnancy increases tenfold between the least deprived and most deprived groups of women (Penn and Owen 2002).

There is some evidence to suggest that partner's smoking status during pregnancy is also influenced by social disadvantage. Moffat and Stanton (2005) surveyed men with low socioeconomic status and found that those men with a higher level of education more likely to quit smoking during pregnancy (Moffat and Stanton 2005).

Therefore, the following effectiveness review will pay specific attention to interventions that address the following socially disadvantaged groups of women and men, including those who are:

- Aged 20 or younger
- In routine and manual occupations
- Lone parents
- Unemployed (or with a partner who is unemployed)



- From black or minority ethnic group
- Looked after in a care setting
- Refugees and asylum seekers

### **3.5 Literature Search**

The Information Collaborating Centre conducted the literature searches for this rapid review in May 2009. The literature searches covered published studies in the following standard databases: CINAHL, EMBASE, MEDLINE, PsycINFO and NHS EED. The database searches produced a total of 855 references once duplicates were removed. A full description of the search terms and processes that were used is presented in Appendices H & I. Studies published in languages other than English were not included in the review.

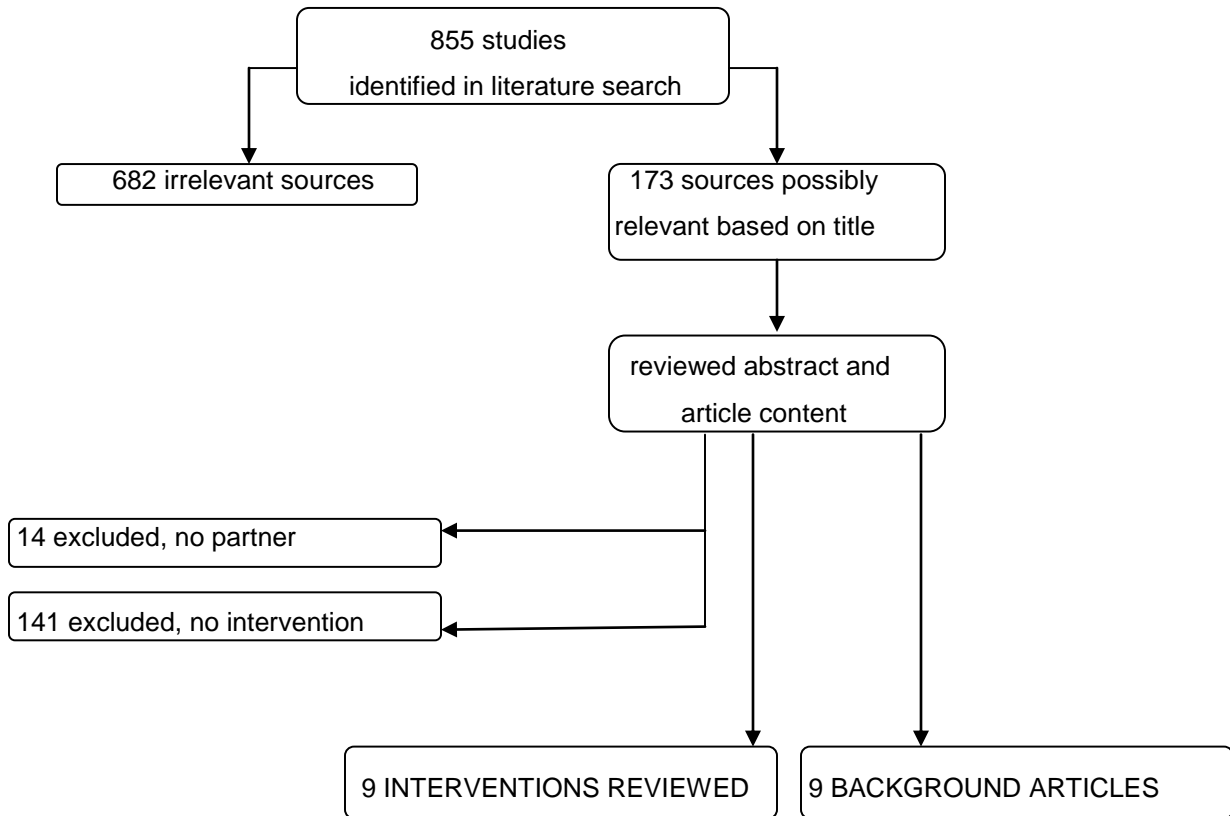
### **3.6 Selection of Studies for Inclusion**

Once the literature searches were complete, the project team at the BCCEWH selected relevant studies using the procedure outlined in the *Methods for the Development of NICE Public Health Guidance*. The titles that emerged from the literature searches were initially scanned by one reviewer who removed 682 articles that were clearly irrelevant to the research questions or outcomes of interest. Abstracts were obtained for the remaining 173 papers. These abstracts (and the full article when further information was required to determine applicability) were scrutinised in relation to the research questions by two reviewers and a further 155 articles were eliminated because the research did not include an intervention or partner support and/or partner smoking was not discussed. This process resulted in 18 articles identified as directly relevant to this report. Nine intervention studies were rated and reviewed; nine articles were used as background for statistical information on quit rates and predictors of cessation success, and qualitative information on couple dynamics in quitting, men's attitudes towards quitting, and women's attitudes towards their partner's support for cessation. Any discrepancies between the two primary reviewers were resolved by a third reviewer.

#### *3.6.1 Studies of Interest*

In order to be included in this review, studies had to describe interventions which examined the impact of partner support or partner smoking on smoking cessation among pregnant women and/or the partners. The intervention could be either targeted at the pregnant woman, the partner or both. Examples included: providing counseling or resources to pregnant women and/or their partners to assist them in quitting smoking, a mass media campaign on smoking during pregnancy, biofeedback interventions, and providing information booklets aimed at facilitating partner support.

**Figure 1. The evidence**



### 3.7 Quality Appraisal

All of the studies that met the inclusion criteria were rated by two independent reviewers in order to determine the strength of the evidence. Once the research design of each study was determined (using the NICE algorithm), studies were assessed for their methodological rigour and quality based on the critical appraisal checklists provided in Appendix F, G, H of *Methods for the Development of NICE Public Health Guidance (Second Edition)*. Each study was categorised by study type and graded using a code ‘++’, ‘+’ or ‘-’, based on the extent to which the potential sources of bias had been minimised. Those studies (n=3) that received discrepant ratings from the two reviewers were resolved by consulting a third reviewer. Inter-rater reliability was 85%.

**Table 1. Type and quality of evidence**

<b>Type and quality of evidence</b>	
Randomised Control Trial (RCT)	
Meta Analyses	
Systematic Reviews	
Case Control Studies	
Cohort Studies	
Controlled Before and After (CBA) Studies	
Interrupted Time Series (ITS) Studies	
Qualitative Studies	
Cross-sectional Studies	
<b>Grading the evidence</b>	
++	<b>All or most of the quality criteria have been fulfilled</b> Where they have been fulfilled the conclusions of the study or review are thought <i>very unlikely</i> to alter
+	<b>Some of the criteria have been fulfilled</b> Where they have been fulfilled the conclusions of the study or review are thought <i>unlikely</i> to alter
-	<b>Few or no criteria fulfilled</b> The conclusions of the study are thought <i>likely or very likely</i> to alter

### 3.8 Synthesis

Evidence tables identifying key characteristics were developed for each of the 9 intervention studies. The research team met to discuss the themes that were emerging from the literature and which research questions and sub-questions each study applied to. For the most part, there was a reasonable fit between the research questions and identified studies. Finally, evidence statements were developed in the final stages of the review once findings for each research question could be summarized. Common themes were identified from each research question and summarized into an evidence statement. Due to heterogeneity of design among the studies, a narrative synthesis was conducted.

#### 4. MAIN FINDINGS

In this section, a summary of the individual studies pertaining to each question will be presented. Following these narrative summaries is an evidence statement which aims to synthesize the findings.

*Primary Questions:*

##### **1. Which interventions are effective in encouraging partners to support smoking cessation during pregnancy and following childbirth?**

Seven studies looked at partner support for women's smoking cessation. Interventions with non-significant outcomes included: a workbook based [+] RCT intervention study by Aveyard and colleagues (1998); one [-] before and after study by Oien and co-authors (2008) and one [+] RCT by McBride and colleagues (2004) which both used a counseling based intervention; a [+] before and after study by Campion and colleagues which used a media education campaign; and one [-](Eurenius, Axelsson et al. 1996) and one [+] (Wakefield and Jones 1998) before and after study that implemented a biofeedback-based intervention without multiple contacts/ follow-up.

In the [+] RCT intervention study by Aveyard and colleagues (1998), three trial arms were compared. The control group received Arm A which included standard treatment and the women were provided with a leaflet. There were two interventions: Arm B and Arm C. Arm B involved midwives being trained on the intervention and a 30 page manual with exercises; midwives were allowed a maximum of 15 minutes to review the manual and the exercises with the woman. Arm C involved all of Arm B and in addition, participants were given a computer program with individualized feedback which took 20 minutes. The study measured change in social support received by women between booking for maternity care, at 30 weeks gestation and 10 days post-partum. Women's scores on the Inventory of Socially Supportive Behaviors (ISSB) declined between booking and 30 weeks gestation, and increased at 10 days postpartum, but these changes did not differ significantly by trial arm.

In the [-] before and after study by Oien and co-authors (2008), women received brief motivational counseling, along with self-help materials on smoking cessation. Women were also encouraged to bring their partners, who (if attending) would also receive information and advice on smoking cessation. This intervention did not result in significant differences in abstinence between the intervention and control cohorts. They found that at six weeks postnatal, 72.4% (CI 95% 59.1–83.3) and 67.9% (CI 95% 57.3–76.9),  $p = 0.34$  of the maternal smokers at inclusion, in the intervention and control cohorts respectively, still smoked.

The [+] before and after study by Campion and colleagues examined the effect of a mass media campaign targeted at women and the partners of pregnant women. The campaign included a series of press advertisements and an unpaid publicity campaign. The smoking status of the before and after group did not differ significantly ( $p > 0.05$ ). Furthermore, there were no significant differences between the groups in smoking behaviour before pregnancy (17% compared to 13%;  $p > 0.05$ ) or during pregnancy (58% compared to 61%;  $p > 0.05$ ). Before the media education campaign, 58% of partners reported to have offered suggestions about smoking behaviour to pregnant women who smoked. This figure was not significantly different after the media campaign (60%;  $p > 0.05$ )

The [+] (Wakefield and Jones 1998) before and after study examined a biofeedback based intervention, which demonstrated the effect of smoking on foetal heart rate. Although not statistically significant, it was found that at 32-34 weeks gestation, biochemically validated cessation in pregnancy was greater in the intervention group of pregnant women (9.3%) compared to the control group (2.8%) after adjusting for age and pre-pregnancy cigarette consumption ( $p=0.07$ ). In late pregnancy, point prevalence quit rates were also lower in the control group (5.1%) compared to the intervention group (10.1%) after adjusting for pre-pregnancy cigarette consumption and age ( $p=0.11$ ). Cessation at 6 months postpartum did not differ significantly between the groups ( $p=0.95$ )

In the [-] before and after study by Eurenus and colleagues (1996), they examined whether or not an ultrasound screening in the second trimester would improve quit rates for women and their partners. The ultrasound procedure had no effect on intention to quit for either the women or the partner. Prior to the ultrasound scan, 54% of the women judged their ability to quit as greater than 50%, dropping to 49% following the ultrasound (no p-values were reported).

McBride and colleagues [+] RCT study utilized graduate-level educated counselors to deliver six telephone counseling calls separately to 193 pregnant women and 192 of their partners. Women and their partners also received self-help booklets with guidance on supporting women's capacity to quit smoking. However, the intervention resulted in no significant improvement in the quit rate for the pregnant women (not significant at  $p=0.025$ ). Note the p-value was stricter because this study had a directional hypothesis (2-way comparison).

Only one study (DeVries et al., 2006), a cluster randomized control trial performed in the Netherlands, had significant outcomes relevant to this question. DeVries and colleagues [+], examined the effectiveness of a health counseling method. The intervention for the women included a video, a booklet and 10 minute counseling session during 2 visits, once during the first contact between midwife and client at about 3 months pregnant and another time at about 8 months during a regularly scheduled consultation. The partners received a booklet which explained that quitting together is important for the health of the baby. The control group received usual care. A significant increase ( $p < 0.10$ ) in

quit attempts (38% versus 23%) and 7 day abstinence (21% versus 12%) for the women was found. However, there was no change in partner smoking. It is uncertain whether this significance is due to encouragement from their partners, since it was reported that 76.2% of the women delivered booklet to the partner, and only 48.5% of the partners reported reading it.

### **Evidence Statement No. 1**

There is limited evidence on which interventions are effective in encouraging partners to support smoking cessation during pregnancy and postpartum. Seven of the intervention studies addressed partner support of women's cessation.<sup>1-7</sup> Studies that reported non-significant outcomes used workbooks (+)<sup>2</sup>, counseling (+ and -)<sup>5, 6</sup>, a media education campaign<sup>3</sup>, or biofeedback methods<sup>4,7</sup>. The one study that reported significant outcomes was a (+) Dutch randomized control trial,<sup>1</sup> targeting the partner to encourage smoking cessation during pregnancy. In this intervention, pregnant women received health counseling along with video and print resources on smoking cessation, while partners received a booklet, explaining that quitting together is important for the health of the baby. However, it is unclear what impact the partner-booklet had on pregnant women's smoking cessation, since 76.2% of the women reported delivering the booklet to their partner, and only 48.5% of partners reported reading the booklet.

1. DeVries, Bakker et al. 2006, Netherlands (+)
2. Aveyard, Lawrence et al. 2005, UK (+)
3. Campion, Owen et al. 1994, UK (+)
4. Eurenus, Axelsson et al. 1996, Sweden (-)
5. McBride, Baucom et al. 2004, US (+)
6. Oien, Storro et al. 2008, Norway (-)
7. Wakefield and Jones 1998, Australia (+)

Applicability: The one study with significant outcomes took place outside of the UK. Therefore, findings may not be directly relevant to the UK.

## **2. Which interventions are effective in encouraging partners who smoke to stop smoking?**

Eight studies examined whether or not interventions were effective in encouraging partners who smoke to stop smoking. Interventions reviewed that reported non-significant findings, include: [+] before and after study which used a media education campaign (Campion, Owen et al. 1994), the use of a partner

delivered booklet in one [+] RCT (de Vries, Bakker et al. 2006) and one [-] RCT (Loke and Lam 2005); one [-] before and after study that used counseling of partners in the intervention (Oien, Storro et al. 2008), and one [-] (Eurenius, Axelsson et al. 1996) and one [+] (Wakefield and Jones 1998) before and after study that implemented a one-time intervention without multiple contacts/ follow-up.

The (+) before and after study by Campion and colleagues (1994) examined the effectiveness of a mass media campaign on smoking prevalence. There were no significant differences after the campaign in the numbers of partners who smoked during pregnancy (48% pre and post;  $z=0.00$ ;  $p>0.05$ )

De Vries and colleagues (2006) tested the effectiveness of a health counselling intervention, which included a partner booklet on smoking cessation. For partners, the group differences were non-significant at all time-points ( $p>0.30$  for each time-point).

In the [-] before and after study by Oien and co-authors (2008), it was found that at six weeks postnatal, 69.9% (CI 95% 62.5–76.4) and 74% (CI 95% 67.2–79.9),  $p = 0.07$  of the fathers at inclusion, in the intervention and control cohorts respectively, still smoked.

In the [-] before and after study by Eurenius and colleagues (1996), they examined whether or not an ultrasound screening in the second trimester would improve quit rates for women and their partners. For the men in the study, 49% stated that their ability to stop smoking was greater than 50% before viewing the ultrasound; after the ultrasound, the rate of men who judged their ability to stop as greater than 50% decreased to 44% (no p-values reported).

Aveyard and colleagues [+] cluster RCT compared the effectiveness of three trial arms: standard care (arm A), a self-help manual (arm B), and self-help manual combined with an interactive computer program (arm C). Although none of the manuals provided directly addressed partner quitting, they measured: social support, and quit rates among partners. There was no significant difference in partner quit rates at 30 weeks gestation (Arm A=3.3%, Arm B=4.1%, Arm C=5.2%,  $p=0.77$ ) or at 10 days postpartum (Arm A=4.8%, Arm B=4.7%, Arm C=7.9%,  $p=0.40$ ).

Two studies reported significant differences in partner quit attempts, though not in partner quit rates. Loke and Lam's [-] RCT examined the effectiveness of an intervention which included advice and educational booklets to pregnant women on encouraging their partners to quit smoking. Measurements were based on women's reports of their partner's smoking. They found significant increase in quit attempts and reduction, but not in cessation rates. The intervention group had a 30% quit attempt vs 22% in the control group ( $p=0.02$ ), and also a greater rate of reduction (39.7% versus 17.7%,  $p<0.0001$ ). However, the reported 30-day

abstinence rate was not significant (6.1% versus 4.2%,  $p=0.26$ ). Wakefield and Jones examined the effectiveness of a biofeedback intervention (demonstration of foetal heart rate due to smoking), along with cessation advice and a self-help booklet. They found that partners were more likely to try to quit in the intervention group (34% compared to 14.9%,  $\chi^2=4.8$ ,  $df=1$ ,  $p=0.03$ ). However, quit rates were not different between the intervention and control groups during pregnancy (2.1% control, 1.8% in the intervention) or postpartum (2.8% control, 4.4% intervention) (no  $p$ -values reported).

Only two of these studies, both RCT's, demonstrated a significant improvement in quit rates for male partners, but the effect was not shown to be sustainable postpartum. McBride and colleagues' [+] RCT study demonstrated an effect prior to, but not after, birth, and Stanton and co-author's [++] RCT did not report quit rates postpartum.

McBride and colleagues RCT study included 183 partners in the intervention group. Participants were recruited from a United States military population with an average age of 25, predominantly low SES and very low education levels. The partner based intervention provided a treatment of 6 telephone counseling sessions with a graduate-level educated counselor, a cessation guide, and free nicotine replacement therapy (NRT) if requested. Telephone counseling calls were made separately to pregnant women and their partners. The individuals received motivational counseling, and in the second and fourth calls, the couple was encouraged to develop a written agreement on helpful partner support behaviours. The complete treatment showed a significant increase in partner quit rate at 28 weeks gestation: 15% for partner intervention vs. 5% for usual care ( $p=0.02$ ), but there were no significant differences in quit rates at 2, 6, and 12 months postpartum.

Stanton and colleagues RCT study [++] included 505 low socioeconomic status (SES) males in Australia, with 291 participating in the intervention group. The first part of the intervention was a telephone consultation with a general practitioner (GP), a referral letter from the participant's GP, a video targeted to men, and free NRT patches. Two additional mailed support packages followed: the first was a cassette and booklet one week after the NRT patches, and the second was a motivational newsletter delivered one month later. The intervention group quit rate was 16.5% vs. 9.3% of usual care ( $p=0.011$ ;  $OR=0.52$ , 95% CI 0.31-0.86) at "prebirth". This particular study did not measure quit rates after birth, and therefore further research is required to determine whether this intervention is sustainable postpartum. However, neither study reported how many participants actually used the NRT.



## **Evidence Statement No. 2**

There is moderate evidence that multi-component interventions that include free nicotine replacement therapies are effective in encouraging partners who smoke to stop smoking. Nine studies examined whether specific interventions were effective in encouraging partners and significant others who smoke to stop smoking.<sup>1-8</sup> Interventions that had non-significant outcomes include: a media education campaign(+)<sup>3</sup>, partner delivered booklet (+ and -)<sup>4</sup>, counseling (+)<sup>8</sup>, one biofeedback-based intervention (+ and -),<sup>5</sup> and self-help guidance (+)<sup>9</sup>.

One [+] RCT<sup>6</sup> and one [+] before and after study examining a biofeedback-based intervention<sup>8</sup> reported significant increase in partner quit attempts, yet no significant differences in quit rates.

Two randomized control trials from the US and Australia [one +, one [++]<sup>1,2</sup> had significant outcomes. These interventions both offered free NRT patches to partners, in conjunction with smoking cessation resources and multiple telephone counseling sessions which encouraged partner support<sup>1</sup>, or along with a minimal intervention which included video and print materials on smoking cessation and multiple contacts to address male partner's smoking<sup>2</sup>. However, the effect of treatment on overall quit rates was not sustained at follow-up periods.

1. McBride, Baucom et al. 2004, US (+)
2. Stanton, Lowe et al. 2004, Australia (++)
3. Campion, Owen et al. 1995, UK (+)
4. Devries, Bakker et al. 2006, Netherlands (+)
5. Eurenus, Axelsson et al. 1996, Sweden (-)
6. Loke and Lam 2005, China (-)
7. Oien, Storro et al. 2008, Norway (-)
8. Wakefield and Jones 1998, Australia (+)
9. Aveyard, Lawrence et al., 2005, UK (+)

Applicability: Both studies with significant findings took place outside of the UK. Therefore, findings may not be directly relevant to the UK.

### *Sub-questions:*

It is worth noting that some of the following questions were difficult to address, because when comparing different interventions it is impossible to conclude whether or not the findings are a result of similarities between studies, or rather due to specific intervention components and conditions that differ between the studies. Therefore, the results described aim to summarize intervention findings according to similar themes, while being cognizant of the differences that do exist between interventions.

### 3. How does the way the intervention is delivered influence effectiveness?

Two studies used biofeedback approaches. In a before and after study performed in Australia, Wakefield and Jones [+] examined if a biofeedback intervention with pregnant woman in conjunction with the provision of an information booklet for the partner would result in improved smoking reduction or cessation. The intervention was delivered by a midwife who provided the pregnant women with a demonstration of a model of the change in fetal heart rate from cigarette consumption. In addition, an informational booklet on smoking cessation was provided to the partner. The intervention was intended to be minimal and carried out as part of routine care. However, there was no significant difference found between maternal quit rates in the control and treatment groups at 6 months postpartum ( $p=0.95$ ). Cessation verified by biochemical validation at 32-34 weeks gestation were higher in the intervention group (9.3%) than in the control group (2.8%) after adjusting for age and pre-pregnancy cigarette consumption ( $OR=1.7$ ; 95% CI = 1.0-3.0;  $p=0.07$ ). In a [-] before and after study performed in Sweden by Eurenus and colleagues, the intervention involved a routine second trimester ultrasound which was viewed by parents separately. The researchers were interested in examining whether or not the ultrasound screening in the second trimester would result in intention to quit in women and their partners. However, it was found that the ultrasound procedure had no effect on intention to quit for either the women or the partner (no  $p$ -values were reported).

Two studies relied on having the women provide the intervention materials to their partners. In a cluster randomized control trial performed in the Netherlands Devries and colleagues [+] investigated the effectiveness of a health counseling method delivered by midwives, targeting pregnant women and their partners. A booklet which explained that quitting together is important to the health of the baby was developed for partners who smoked, and provided to the woman to give to their partners. However, the partner booklet had no significant effect on the smoking behaviour of the partner. Furthermore, only 76.2% of the women in the experimental group self-reported to have provided their partner with booklet and only 48.4% of those partners who received it reported to have read it. In China, a randomized control trial by Loke and Lam [-] was performed to determine whether a brief intervention with pregnant women, delivered by obstetricians, would help them encourage their partners to quit or reduce smoking. The intervention involved physicians delivering brief scripted advice on the harms of second hand smoke. The pregnant women in the study were also provided with a book of strategies to help their husbands stop smoking. However, no significant difference (6.1% vs 4.2%,  $p=0.26$ ) was observed at end of treatment (i.e., 30 day).

One randomized control study in Australia provided free nicotine replacement therapy. Stanton and colleagues (2004) aimed to determine the effectiveness of a smoking cessation program designed to reduce smoking rates in men with

pregnant partners. Men were provided with one-week supply of nicotine patches, booklets and a cassette tape on how to use the patches. In addition, the doctor explained the use of the nicotine patch, recommended a dosage for the seven day sample and wrote a prescription for a further three week supply of patches. An 18 minute video introduced by a national football personality on becoming a father and on the passive smoking health risks for the newborn was also provided. The video and the patches were provided after the baseline interview. A week later, support material was sent to the participants. A month later, support materials were sent to the participants again. A significant difference was found between the control and intervention groups. 16.5% of the intervention group and 9.3% of the control group reported they had stopped smoking ( $P=0.01$ ,  $OR = 0.52$ ,  $95\%CI = 0.31-0.86$ ). This study demonstrates that access to nicotine patches combined with follow-up cessation support materials can increase quit rates. The study did not indicate the percentage of men who utilized the NRT.

### **Evidence Statement No. 3**

There is limited evidence that the method of delivery influences the effectiveness of interventions targeting partners and significant others in supporting smoking cessation during pregnancy and following childbirth. Biofeedback approaches, such as using a demonstration of the health of the fetus with an ultrasound<sup>2</sup> or a model of fetal heart rate<sup>1</sup> did not show any significant results in two before and after studies conducted in Australia (+)<sup>1</sup> and Sweden (-)<sup>2</sup>. Furthermore, relying on the woman to provide the intervention materials to her partner also had no significant effect on smoking outcomes in two RCT studies in the Netherlands (+)<sup>3</sup> and China (-)<sup>4</sup>. Providing free nicotine replacement therapy and having intensive interventions, showed a significant effect on smoking outcomes in one Australia-based (++) RCT<sup>5</sup>.

1. Wakefield and Jones 1998, Australia (+)
2. Eurenus, Axelsson et al. 1996, Sweden (-)
3. Devries, Bakker et al. 2006, Netherlands (+)
4. Loke and Lam 2005, China (-)
5. Stanton, Lowe et al. 2004, Australia (++)

Applicability: All studies were conducted outside of the UK. Therefore, findings may not be directly relevant to the UK.

#### 4. Does effectiveness depend on the status of the person delivering it

McBride and colleagues RCT study [+] utilized graduate-level educated counselors to deliver six telephone counseling calls separately to 193 pregnant women and 192 of their partners. Women and their partners also received self-help guides. The intervention resulted in no significant improvement in the quit rate for the pregnant women, but produced a significant increase in partner quit rate at 28 weeks gestation: 15% for partner intervention vs. 5% for usual care ( $p=0.02$ ). However, there were no significant differences in partner quit rates at 2, 6, and 12 months postpartum.

Stanton and colleagues [++] carried out a RCT study in Australia (2004). In this intervention, general practitioners performed the initial counseling and screening calls, targeting partners of pregnant women. The intervention group quit rate was 16.5% vs. 9.3% of usual care ( $p=0.011$ ; OR=0.52, 95% CI 0.31-0.86) at “prebirth” report.

In the [+] Netherlands-based RCT study by DeVries and colleagues, midwives delivered a brief intervention (10 minute counseling session) to 141 pregnant women during each office visit. The counseling session was based on a persuasion communication model. A booklet detailing the importance of smoking cessation was also provided to the pregnant women to distribute to their partners. The result for the pregnant women at 7 days abstinence was 21% for the intervention vs. 12% for the control group ( $p<0.01$ ) at 6 weeks postpartum. There was no significant effect for the partners of the pregnant women.

#### **Evidence Statement No. 4**

While no studies specifically examined whether the status of the person delivering an intervention influences effectiveness, the three studies that demonstrated significant effects (out of the nine studies reviewed) were delivered by highly trained medical personnel. Effective interventions in three RCTs [one ++ and two +] conducted in the US,<sup>1</sup> Australia,<sup>2</sup> and the Netherlands<sup>3</sup> utilized highly trained medical personnel to deliver interventions (including graduate-level educated counselors, general practitioners and midwives), but in two of the studies there was either no significant effect of the intervention on smoking cessation outcome<sup>1</sup> or effectiveness was not measured<sup>2</sup> at postpartum. However, because these studies did not examine the impact of the status of the person delivering the intervention on its effectiveness, further research is required to answer this question.

1. McBride, Baucom et al. 2004, US (+)
2. Stanton, Lowe et al. 2004, Australia (++)
3. DeVries, Bakker et al. 2008, Netherlands (+)

Applicability: All studies were conducted outside of the UK. Therefore, findings may not be directly relevant to the UK.

## 5. Does the site/setting influence effectiveness?

In an Australian-based randomized control trial [++], Stanton and colleagues (2004) examined an intervention that was delivered in the home of the subjects. The study assessed whether an intervention targeting partners would result in improved quit rates for low SES men with pregnant partners. The intervention group self-report quit rate was 16.5% as compared to the control group rate of 9.3% ( $p=0.011$ ). 45 out of 73 quitters were verified by in home carbon monoxide test. The study verified 95.8% of intervention quitters and 66.7% of control quitters. There was a significant increase of 7.2% in quit rate with intervention ( $p=0.011$ ). It is possible that receiving the intervention in the home contributed to its effectiveness. However, this was not specifically assessed, and therefore further research is required to test this potential effect.

Other studies (Aveyard, Lawrence et al., 2005 [+]; Eurenus, Axelsson et al., 1996 [-]; Oien, Storro et al., 2008 [-]; Wakefield and Jones, 1998 [+]) in which the main intervention took place at an office or a clinic showed no significant results. Again, these studies did not specifically examine the impact of the site/ setting on intervention effectiveness, so it is not possible to determine whether or not ineffectiveness is a result of the particular site/ setting of the intervention. Therefore, it is possible that these results are due to other intervention components described in each study, rather than the site/ setting where the interventions were conducted.

In a [-] RCT conducted in China by Loke and Lam (2005), pregnant women who were illiterate were excluded from participating in the study. Unlike the UK, China is a “developing” country where illiteracy is widespread; therefore, the intervention is not applicable to setting of the study (ie. Chinese context). As well, the investigators stated that the interventions performed were unlike the UK since health professionals do not consider passive smoking to be an issue. Therefore, since standard care for pregnant women in China involves no mention of the problems due to passive smoking, the study investigated effectiveness of brief advise on quit/ reduction of partner smoking given to non-smoking wives. The intervention took place at the OB/GYN office and it involved physicians delivering a brief scripted advice on the harms of second hand smoke. Pregnant women were also provided with a book of strategies to help their husband stop smoking. Therefore, the intervention for the partner was delivered in the home. However, the 30 day quit rate (6.1% vs 4.2%) difference was found not to be significant.

### **Evidence Statement No. 5**

While no studies specifically examined the effects of the site/setting of the intervention, one study provides some relevant evidence related to the site of an intervention and another intervention took into consideration the setting (context). In particular, significant results were obtained in one (++) Australian-based RCT study<sup>1</sup> in which the intervention was performed in participants' homes.. In addition, one (-) RCT study based in China included only literate participants, which may not be applicable to the Chinese context, where illiteracy rates are high.<sup>2</sup>

1. Stanton, Lowe et al. 2004, Australia (++)
2. Loke and Lam 2005, China (-)

Applicability: Studies were conducted in Australia and China. Therefore, findings may not be directly relevant to the UK.

### **6. Does the intensity of the intervention influence effectiveness or duration of effect?**

McBride and colleagues [+] RCT study examined the effectiveness of a partner-targeted intervention. The intervention included 6 telephone counseling calls to US military-based partners of pregnant women, 3 in pregnancy and 3 postpartum. The calls during pregnancy were conducted at timely intervals to ensure that they occurred in each trimester. The postpartum calls occurred at monthly intervals. They found a significant increase in partner quit rate at 28 weeks gestation: 15% for partner intervention vs. 5% for usual care ( $p=0.02$ ), but there were no significant differences in quit rates at 2, 6, and 12 months postpartum. There was no significant effect on the quit rates of the pregnant women.

Stanton and colleagues Australian based [++] RCT study focused on partners, also included multiple follow-ups. Partners received 4 contacts: one from a GP by telephone, and three with follow-up mailings. The participants who contacted their own GP as requested would have had one additional contact. The intervention group quit rate was 16.5% (verified by carbon monoxide test, 95.8%), vs. 9.3% of Usual Care ( $p=0.011$ ; OR=0.52, 95% CI 0.31-0.86) at "prebirth" report.

The intervention in Devries and colleagues [+] RCT study, which was based in the Netherlands, offered a 10 minute persuasion communication based counseling for 141 women during every medical visit. The result for 7 days abstinence for pregnant women was 21% for the intervention vs. 12% for the

control group ( $p < 0.01$ ) at 6 weeks postpartum. There was no significant effect on the quit rates of the partners.

However, findings are inconsistent, as not all interventions that included multiple contacts reported significant effects. No significant improvements in quit rates were found for pregnant women in the [+] study by McBride, Baucom et al. 2004. The [-] before and after study by Oien, Storro et al. (2008) in Norway provided 2,051 women in the intervention group with a verbal consultation at each of 8-10 prenatal visits. Yet the treatment did not result in a significant impact on quitting or reduction for the women or the unrecorded number of partners who attended the office visits with them.

#### **Evidence Statement No. 6**

There is inconsistent evidence whether or not the intensity of the intervention influences its effectiveness. Direct and repeated contact was part of effective interventions in 3 RCT studies [one ++, two +] conducted in the US, Australia and the Netherlands, resulted in significant cessation effect with partners<sup>1,2</sup> and with pregnant women.<sup>3</sup> However, repeated contacts in 1 US-based RCT [+] and 1 Norwegian before and after study [-] did not result in significant increases in cessation for pregnant women<sup>1</sup> or pregnant women and their partners<sup>4</sup>.

1. McBride, Baucom et al. 2004, US (+)
2. Stanton, Lowe et al. 2004, Australia (++)
3. DeVries, Bakker et al. 2006, Netherlands, (+)
4. Oien, Storro et al. 2008, Norway (-)

Applicability: Studies were conducted outside of the UK, and therefore may not be directly relevant to the UK.

#### **7. How does effectiveness vary according to the age, sex, socio-economic status or ethnicity of the target audience?**

In the UK, a [+] cluster randomized control trial by Aveyard and colleagues [+] was performed to look at whether a smoking cessation program delivered to women would have an impact on the quit rate of partners. The majority of the subjects were white with a mean age 26.5, had an income of \$100-200 week and did not complete their high school education. There was no significant effect on quit rate found in the partners for either intervention. The dropout rate was 18.6% for the follow up and those who dropped out had significantly lower

educational attainment. The effectiveness of the interventions could have been affected due to the drop outs having a significantly lower educational level. In an [+] American cluster randomized control trial by McBride and colleagues (2004), there was also a significant loss for follow-up by low education and low income respondents.

In a [++] randomized control study performed in Australia by Stanton and colleagues 2004, they examined whether or not an easily implemented intervention could result in improved quit rates for low SES men with pregnant partners. The participants in the study had a low SES as shown by 46% in unskilled and 40% in semiskilled occupations. Factors that were significantly associated with quitting included: having a semiskilled occupation, having more quit attempts of 2 weeks or more in duration in the past year, and having a longer time before smoking the first cigarette of the day. 16.5% of the intervention group and 9.3% of the control group reported they had stopped smoking ( $P=0.01$ ,  $OR = 0.52$ ,  $95\%CI = 0.31-0.86$ ).

While the [+] before and after study did not examine the effectiveness of the intervention among different income or age groups, the mass media campaign described did target young (age 15-24) women in lower and middle income groups, along with the partners of the pregnant women. However, there were no significant differences between the groups in smoking behaviour before pregnancy (17% compared to 13%;  $p>0.05$ ) or during pregnancy (58% compared to 61%;  $p > 0.05$ ).

#### **Evidence Statement No. 7**

There is strong evidence that effectiveness of an intervention may be influenced by the socioeconomic status of the target audience. Evidence from two (+) RCT studies, demonstrates that dropouts are significantly higher among those participants with lower education and income<sup>1,2</sup>. One (++) RCT study targeting male partners revealed that men with a skilled job exhibited a higher quit rate, more quit attempts and (for those who continue to smoke) smoked their first cigarette of the day later than unskilled workers<sup>3</sup>. One [+] before and after study described a mass media campaign targeted to young, low and middle income pregnant women<sup>4</sup>; however, the intervention yielded no significant changes in smoking prevalence.

There was no available evidence examining the impact of sex or ethnicity.

1. Aveyard, Lawrence et al. 2005, UK (+)
2. McBride, Baucom et al. 2004, US (+)
3. Stanton, Lowe et al. 2004, Australia (++)
4. Champion, Owen et al., 1994, UK (+)

Applicability: Two studies<sup>1,4</sup> were conducted in the UK, and therefore the evidence from these studies is relevant. While the other studies were conducted outside of the UK, the findings support UK-based evidence.



## 8. What are the facilitators and barriers to implementation<sup>1</sup>?

As discussed previously, interventions which include multiple contacts may be more effective. Interventions that did not deliver the intervention at multiple time points did not have significant effects. The three types of interventions tested that did not deliver an intervention multiple times were (1) biofeedback demonstrations: Eurenus and colleagues (1996) [-] before and after study based in Sweden with 116 participants, and Wakefield & Jones (1998) [+] before and after study based in Australia with 110 participants; (2) partner booklets: Loke & Lam's (2005) [-] RCT conducted in China with 380 participants; and (3) a one time media campaign tested by the Campion and colleagues (1994) [+]. The UK based before and after study by Campion and colleagues (1994) included 607 women and partners who were under age 25 and low SES. None of these interventions had significant results. Given these findings, a barrier to effective implementation is likely to be the lack of multiple contacts/ follow-up during an intervention.

Another barrier to implementation is the lack of effectiveness in the postpartum period. In the three studies that had significant improvements in quit rates, the effect of treatment was not demonstrated at postpartum. DeVries and colleagues (2006) [+] RCT based in the Netherlands, resulted in an improvement for women in 7 days abstinence in 21% of the intervention group vs. 12% for the control group ( $p < 0.01$ ) at 6 weeks postpartum. The improvement in partner quit rates in McBride and colleagues (2004) US-based [+] RCT at 28 weeks gestation was 15% for partner intervention vs. 5% for usual care ( $p = 0.02$ ), but this was only a temporary impact with no significant improvement in partner quit rates at 2, 6, and 12 months postpartum. For Stanton and colleagues (2004) [++] Australian-based RCT, the quit rate was 16.5% as compared to 9.3% of usual care ( $p = 0.011$ ; OR=0.52, 95% CI 0.31-0.86). However, this is a "prebirth" rate that may be affected by relapse following the birth.

Two of the three studies with significant treatment results used videos as a component. The study by DeVries and colleagues (2006) [+] RCT, based in the Netherlands, examined an intervention delivered to 141 women. The intervention included a video at the initial office visit as part of the treatment package, and the study found a significant improvement in 7 days abstinence in 21% of the intervention group vs. 12% for the control group ( $p < 0.01$ ) at 6 weeks postpartum. In the Australian based [++] by Stanton and colleagues (2004), 291 partners were mailed a video featuring a popular sports personality as part of the treatment. The intervention resulted in a significantly greater quit rate before birth between the intervention group and usual care group (16.5% vs 9.3%;  $p = 0.011$ ; OR=0.52, 95% CI 0.31-0.86). The use of videos may be a promising treatment

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<sup>1</sup> Only the nine included studies were reviewed for potential facilitators and barriers to the implementation of the intervention. However, the qualitative studies reviewed in the discussion section of this report also provide insight into some of the challenges associated with cessation during pregnancy for pregnant women and their partners.

component that can be tailored to gender, SES, or other target population, and is easily delivered.

Free NRT patches were offered to partners in the two interventions with significant results for partners. Unfortunately, no data were collected on their actual use, which precludes a sound assessment on their effectiveness. Free NRT patches were offered if requested to the 183 partners in the intervention group in McBride and colleagues' US-based [+] RCT, with a significant increase in partner quit rate at 28 weeks gestation: 15% for partner intervention vs. 5% for usual care ( $p=0.02$ ), but with no significant differences in quit rates at 2, 6, and 12 months postpartum. The Australian based [++] RCT by Stanton and colleagues (2004) partner intervention utilized a GP to prescribe the free patches and discuss their use, and the patches were mailed to the 291 treatment group participants as a major part of the intervention. The intervention quit rate was 16.5% vs. 9.3% of usual care ( $p=0.011$ ; OR=0.52, 95% CI 0.31-0.86).

#### **Evidence Statement No. 8**

An important barrier to consider for treatment implementation may be the ineffectiveness of one time treatments. In 3 before and after studies [one -, two +] and 2 RCTs [one +, one -]<sup>1-4</sup> employing one time treatments the interventions were ineffective.<sup>1-4</sup>

There is moderate evidence that another barrier to the implementation of interventions during pregnancy on smoking cessation of partners or pregnant smokers is the lack of a sustained effect of the interventions in the postpartum period. In the 3 RCTs where effectiveness was demonstrated, impact was either not measured or not effective at postpartum [one ++, two +] with significant results<sup>5-8</sup>.

There is moderate evidence that the use of videos and NRTs in interventions may enhance the effectiveness of interventions. In RCT studies, interventions which included videos [one ++, one +]<sup>3, 7</sup> and/or NRT for partners [both +]<sup>3, 6</sup> reported significant effects.

1. Eurenus, Axelsson et al. 1996, Sweden (-)
2. Wakefield & Jones 1998, Australia (+)
3. Loke & Lam 2005, China (-)
4. Campion, Owen et al. 1994, UK (+)
5. Devries, Bakker et al. 2006, Netherlands (+)
6. McBride, Baucom et al. 2004, US (+)
7. Stanton, Lowe 2004, Australia (++)

Applicability: One study<sup>5</sup> was conducted in the UK, and therefore the evidence from this study is relevant. The other studies were conducted outside of the UK, and therefore may not be directly applicable to the UK-context.

## **5. OVERVIEW & DISCUSSION**

While there was evidence examining partner support and partner smoking in smoking cessation interventions during pregnancy, few intervention studies actually demonstrated significant results in either encouraging partners to support smoking cessation during pregnancy and postpartum, or in improving partner's smoking cessation. The lack of effective interventions for addressing partner support of smoking cessation and partner smoking during pregnancy, suggests the need for further research in this area.

There was also a lack of information on how the site/setting influenced the effectiveness of the intervention. However, one article did describe an intervention that was delivered in the home, which was found to have a significant effect for partners of pregnant women, and it is possible that the site/setting had an impact on partner's smoking (Stanton, Lowe et al. 2004). Another intervention conducted in China (Loke and Lam 2005), while not explicitly examining the impact of site/ setting on an intervention, does have important implications related to the tailoring of interventions to the specific setting and cultural context of the intervention. Specifically, this intervention excluded pregnant women who were illiterate, despite the fact that the intervention was implemented in China—where rates of illiteracy are high. Therefore, the findings may not be applicable to the Chinese context.

There was also a lack of evidence examining how the status of the person delivering an intervention influences its effectiveness. While no studies specifically explored this question, three studies (McBride, Baucom et al. 2004; Stanton, Lowe et al. 2004; de Vries, Bakker et al. 2006) with significant results were delivered by trained medical professionals. However, these effects were either not reported or not sustained at postpartum.

Additionally, there was no evidence that addressed how the effectiveness of an intervention varies according to the age, sex or ethnicity of the target audience.

### *Limitations*

Much of the research identified within this review referred to interventions that were not based in the UK. The demographics of participants in Australian, Dutch, Norwegian, Chinese, Swedish and US studies may differ from the demographics of English women and men. As a result it is not clear whether all findings are directly applicable to the UK.

A second limitation of this review is that some of the studies did not measure cessation rates of pregnant women or their partners at postpartum. Therefore, less is known about the sustainability of these interventions. Given that relapse rates are high postpartum, this is a significant concern.

A third limitation of this review is that in many of the studies, the measure of partner's smoking status was based on the pregnant women's recall or self report data. This resulted in many studies receiving a lower rating. Therefore, it is possible that these studies may over-report partner quit rates.

A final limitation of this review is that studies included only the male partner (defined as the expecting father) of the pregnant woman. Therefore, there is no evidence on the impact of interventions which include significant others such as: friends, room-mates, other family members, etc. In addition, no studies included in the review mentioned the inclusion of women partners.

### *Key Findings*

Overall, little evidence demonstrates effectiveness in encouraging partners to support smoking cessation during pregnancy and postpartum. Only one study found that partner support had a significant effect on smoking cessation for pregnant women (de Vries, Bakker et al. 2006). In this intervention, the partner received a booklet that explained the importance of quitting together. While women demonstrated a significant increase in quit attempts and 7-day abstinence, there was no change in partner smoking. Furthermore, it was unclear from the study whether or not the significant change in smoking for women was a result of partner support, given that less than half (48.5%) of the partners reported reading the booklet.

There is however, moderate evidence that cessation interventions during pregnancy can impact partner's smoking. One intervention which included counselling sessions and NRT by request, for partners found a significant decrease in partner's smoking during the pregnancy (McBride, Baucom et al. 2004). However, this was not sustained at 2, 6 or 12 months postpartum, suggesting that relapse is also an issue of concern in regards to partner's smoking status. Another intervention with partners that included smoking cessation information and free NRT's resulted in a significant increase in partner's quit rates, but measurements were only taken pre-birth (Stanton, Lowe et al. 2004). Together, these findings suggest that NRT, in combination with smoking cessation information and resources, may result in increased cessation among partners. However, there is limited evidence to suggest that these improvements are sustainable post-partum.

Limited evidence suggests that the way an intervention is delivered influences its effectiveness. Two studies that used biofeedback methods, one by demonstrating change in foetal heart rate due to smoking (Wakefield, Reid et al. 1998) and the other in providing an ultrasound to each parent to view separately (Eurenius, Axelsson et al. 1996), did not have significant effects on cessation for either pregnant woman or partner. Using biofeedback demonstrations in and of itself may not be an effective method of delivery. In two studies, the pregnant women provided the intervention to their partners, yet with no significant effect on

the smoking status of the partner (Loke and Lam 2005; de Vries, Bakker et al. 2006). However, in one intervention, a significant increase in cessation was found for partners who received an intensive intervention, including a variety of informational resources and the nicotine patch (Stanton, Lowe et al. 2004).

No studies specifically examined how the status of the person delivering an intervention influences its effectiveness. However, effective interventions in three studies were delivered by high level medical personnel. However, neither was the specific impact of the person delivering the intervention on outcomes reported, nor was the sustained effect of such interventions in the postpartum period (McBride, Baucom et al. 2004; Stanton, Lowe et al. 2004; de Vries, Bakker et al. 2006).

While no studies specifically examined how the site/ setting influences effectiveness, one study described a home-based intervention, which was found to have a significant effect for low socioeconomic status (SES) partners of pregnant women (Stanton, Lowe et al. 2004). An analysis of an intervention conducted in China (Loke and Lam 2005) highlights the importance of designing interventions that match the characteristics and needs of the population—interventions should take into account the settings in which they occur.

Strong evidence from three studies, reveals that the effectiveness of the intervention varies according to the socioeconomic status of the partner (McBride, Baucom et al. 2004; Stanton, Lowe et al. 2004; Aveyard, Lawrence et al. 2005). Two of these studies found that partners with lower education and income levels were more likely to drop out of the intervention (McBride, Baucom et al. 2004; Aveyard, Lawrence et al. 2005). Stanton and colleagues found that men with semi-skilled occupations had greater quit attempts than men in unskilled occupations (Stanton, Lowe et al. 2004). A study by Champion and colleagues (1994) did not compare different age and income groups, but the mass media campaign examined did target young, low and middle income pregnant women. However, there was no significant decrease in smoking prevalence after the implementation of the campaign.

There is inconsistent evidence that the intensity of the intervention influences its effectiveness. Direct and repeated contact was part of effective interventions in 3 studies (McBride, Baucom et al. 2004; Stanton, Lowe et al. 2004; de Vries, Bakker et al. 2006), but repeated contacts in 1 RCT [+] and 1 before and after study [-] did not guarantee significant effects for pregnant women (McBride, Baucom et al., 2004) or pregnant women and their partners (Oien, Storro et al., 2008) .

There are a number of identified facilitators or barriers to the implementation of an intervention. Significant barriers to treatment implementation are the ineffectiveness of one time treatments in five studies (Champion, Owen et al. 1994; Eurenus, Axelsson et al. 1996; Wakefield, Reid et al. 1998; Loke and Lam 2005) and the unsustainable impact of treatment in the 3 studies with significant

results (McBride, Baucom et al. 2004; Stanton, Lowe et al. 2004; de Vries, Bakker et al. 2006). Interventions that included video-based cessation information (Stanton, Lowe et al. 2004; de Vries, Bakker et al. 2006) and NRT for partners (McBride, Baucom et al. 2004; Stanton, Lowe et al. 2004) reported significant effects..

Finally, it is not clear whether the results of the literature identified will be directly applicable to the UK. The majority of studies reviewed were based in other countries, including the US, Sweden, Norway, the Netherlands, China and Australia. Only two (Campion, Owen et al. 1994; Aveyard, Lawrence et al. 2005) out of ten studies were conducted in the UK. To further determine the effectiveness of interventions in the UK, more UK specific research is needed.

### *Partner Smoking & Partner Support: Qualitative Findings*

Nine studies were omitted from the quality appraisal phase because they did not describe an intervention, and therefore did not address the research questions and sub-questions. However, these studies provide useful information on the social context of smoking during pregnancy for women and their partners, as well as implications for further research.

Some of the interventions that did not report significant findings focused primarily on the health of the fetus (Eurenius, Axelsson et al. 1996; Wakefield, Reid et al. 1998). It is possible that interventions that support both parents to quit for themselves, rather than focus on the fetus and the period of gestation may be more effective and sustainable (Ziebland and Fuller 2001). While health promotion messaging has typically focused more on the health of the baby, and the smoking behaviour of the pregnant woman, there is some evidence, for example, from a qualitative study in the UK that smoking cessation interventions need to focus on supporting partners to quit smoking (Ziebland and Fuller 2001). In this study, women often expressed that even if their partner was not smoking in front of them, just knowing that they were continuing to smoke made it more difficult to maintain cessation. In some cases, a lack of knowledge may impede men's smoking cessation during pregnancy. An Australian based study by Moffatt (2005) examined low SES fathers and found that men reported a lack of knowledge of the effects of passive smoking (Moffatt and Stanton 2005). However, knowledge of the negative health impacts of secondhand smoke were associated with quit attempts early in the pregnancy and successful quit attempts measured at the end of pregnancy. Together, these findings suggest that further research and interventions are needed that target men, and that focus on the health of both the man and the partner may be more successful, rather than focusing on the temporal period of gestation.

Qualitative research reveals that men's smoking is a complex behaviour. \_Bottorff and colleagues have identified connections between smoking and dominant

ideals of masculinity such as strength and independence (Bottorff, Oliffe et al. 2006). They found that some men use smoking to cope with the stress of becoming a new father (Bottorff, Oliffe et al. 2006). To maintain their behaviour, men may downplay the risks involved with smoking both for themselves and for their partner and child (Bottorff, Oliffe et al. 2006) (Wakefield, Reid et al. 1998). During focus groups, low SES men expressed that they were more concerned with the economic effects of smoking than the health effects (Wakefield and Reid, 1998). In another study, Bottorff and colleagues' found that men reported different themes related to quitting or trying to quit, but common to all reported narratives was a reluctance to utilize cessation resources (Bottorff, Radsma et al. 2009). Instead, there was a common expression of the masculine ideal of "independence." Therefore, gender sensitive smoking cessation interventions may be needed that account for male perceptions on smoking cessation, and that challenge economic and social structures that create and maintain these ideals of masculinity (Bottorff, Oliffe et al. 2006).

In addition, further research and interventions are needed that examine and value the social context of smoking during pregnancy. Some evidence from qualitative research has revealed the importance of the social context and relationship dynamics to smoking reduction and cessation during pregnancy (Bottorff, Kalaw et al. 2006; Bottorff, Oliffe et al. 2006; Greaves, Kalaw et al. 2007; Bottorff, Radsma et al. 2009). Couples exhibit various interaction patterns when reducing or quitting smoking during pregnancy, ranging from accommodating to conflictual (Bottorff, Kalaw et al. 2006). Greaves and colleagues demonstrate how tobacco cessation during pregnancy may lead to increased partner conflict and control, depending on pre-existing power dynamics (Greaves, Kalaw et al. 2007). Bottorff and colleagues suggest a "delinked yet couple focused" method of treatment, that would support women and partners on methods for creating supportive environments for tobacco reduction and cessation, yet interventions would be individually implemented to account for relationship and power dynamics and the potential for violence and conflict during smoking cessation (Bottorff, Kalaw et al. 2006). However, intervention studies are needed that incorporate and test these components (Bottorff, Kalaw et al. 2006).

## **6. CONCLUSIONS & RECOMMENDATIONS**

Findings from this review reveal that there are very few effective smoking cessation interventions that include partners or examine partner smoking during pregnancy. It is important to note that interventions that have been effective elsewhere are not necessarily effective with this sub-group. While the evidence supports few conclusive recommendations, the findings do reveal some of the barriers to developing an effective intervention, as well as promising intervention components and issues for further investigation.

There is evidence that intensity of the intervention is important. Interventions may be more effective if they incorporate multiple points of contact/ follow-up. As well, interventions that are delivered to the partner by someone other than the pregnant woman may be more effective. Finally, interventions that are tailored to the specific setting and population they are targeting may be more effective. In particular, interventions with low income women and men may need to address barriers that these sub-populations face, both with smoking reduction and cessation, and with participating in a particular intervention.

As well, there is evidence from this review indicating that cessation interventions are often not sustainable into the postpartum period. While NRT, in combination with smoking cessation information and resources may result in significant decreases in smoking among partners, there is no evidence that these improvements are sustainable post-partum. In general, interventions that demonstrated some effect either did not report postpartum cessation rates, or did not demonstrate effectiveness at postpartum. These findings suggest the need for intervention research that focuses on cessation/reduction beyond the period of gestation, and that address relapse both for the pregnant woman and her partner.

Given that most partners are men, further gender specific research examining masculinities is required to fully understand the dynamics of male smoking during and after childbirth.

Finally, the majority of studies reviewed were based in other countries, including the US, Sweden, the Netherlands, China and Australia. Only two (Campion, Owen et al. 1994; Aveyard, Lawrence et al. 2005) out of nine studies were conducted in the UK. To further determine the effectiveness of interventions in the UK, more UK specific research is needed.



## Evidence Tables (Included Studies)

Study Details	Population & Setting	Method of allocation to intervention/control	Outcomes & methods of analysis	Results	Notes
<p>Authors: Aveyard, Paul Lawrence, Terry Evans, Olga Cheng, CC</p> <p>Year: 2005</p> <p>Citation: BMC Public Health 5 (80) [copy not paginated]</p> <p>Aim of study: Does smoking cessation program delivered to women have an impact on the quit rate of partners?</p> <p>Study design: Cluster</p>	<p>Source population: UK</p> <p>Eligible population: Women over 16 booking antenatal midwife care, current smokers</p> <p>Selected population: Patients in general practice (i.e. not hospital care) – estimated 42% of eligible. “almost all</p>	<p>Method of allocation: Computerized minimization algorithm by SES, urban/rural, and birth rate</p> <p>Intervention description: Arm B 30 page manual with exercises reviewed for up to 15 minutes with midwife. Arm C All Arm B plus 20 minute computer program providing individualized feedback</p>	<p>Method of allocation: Computerized minimization algorithm by SES, urban/rural, and birth rate</p> <p>Intervention description: Arm B 30 page manual with exercises reviewed for up to 15 minutes with midwife. Arm C All Arm B plus 20 minute computer program providing individualized feedback</p>	<p>Primary outcomes: No significant effect whatsoever on quit rate for either intervention.</p> <p>Partner quitting at 30 weeks gestation (p=0.77). Partner quitting at 10 days postpartum (p=0.40)</p> <p>Partner quitting at 10 days postpartum (p=0.40)</p> <p>Secondary outcomes: Attrition details: 18.6% not in follow-up, drops had significantly lower educational attainment</p>	<p>Primary outcomes: No significant effect whatsoever on quit rate for either intervention. Partner quitting at 30 weeks gestation (p=0.77). Partner quitting at 10 days postpartum (p=0.40)</p> <p>Secondary outcomes: Attrition details: 18.6% not in follow-up, drops had significantly lower educational attainment</p>

randomized control trial	white” 2/3 multipari- ous, mean age 26.5, income 100-200 week, education through 16 years. Average cigarette consumption: 6/day Average Fagerstrom score= 3 2/3 had smoking partner	Control/comparison description: Arm A: Standard care, women given 5 page booklet	Control/comparison description: Arm A: Standard care, women given 5 page booklet	18.6% not in follow-up, drops had significantly lower educational attainment
Quality score: +		Sample sizes: Total n=918 Partner smoking=571 Group numbers not reported.	Sample sizes: Total n=918 Partner smoking=571 Group numbers not reported.	
External validity score: EV + Possible bias from high drop out of lower education participants		Baseline comparisons: Compared quit rates of women partners in each arm.	Baseline comparisons: Compared quit rates of women partners in each arm.	
	Excluded population: Under 16	Study sufficiently powered? Not reported	Study sufficiently powered? Not reported	
	Setting: UK general midwife practice			

<p>Authors: Campion, Patrick Owen, Lesley McNeill, Ann McGuire, Christine</p> <p>Year: 1994</p> <p>Citation: Addiction 89, 1245-1254</p> <p>Aim of study: How much impact did a media campaign on smoking and pregnancy on the knowledge, attitudes, and smoking behaviours of women and their partners.</p>	<p>Source population: UK women 15-24 and their partners target population</p> <p>Eligible population: women aged 15-24, pregnant</p> <p>Selected population: Low SES pregnant women</p> <p>Excluded population:</p> <p>Setting: In home interviews</p>	<p>Method of allocation: Quota sampling</p> <p>Intervention description: Health education Authority Smoking and Pregnancy Campaign. 3 themed ads in 6 tabloid newspapers (34.9 million readers), 11 placements in 10s. Campaign also received press, radio, and TV coverage.</p> <p>Control/comparison description: NA</p>	<p>Primary outcomes: Women's awareness of passive smoking harms increased from 10% to 19% (<math>p &lt; 0.05</math>)</p> <p>Secondary outcomes: None</p> <p>Follow-up periods: 10 days</p> <p>Method of analysis: Before and after questionnaire, with Z scores and two- tailed significance tests</p>	<p>Primary outcomes: Increase in awareness of passive smoking harms for women.</p> <p>No increase in quit attempts for women. No increase in quit attempts for partners.</p> <p>Secondary outcomes: Attrition details: NA</p>	<p>Limitations identified by author: none</p> <p>Limitations identified by review team: Partner report for men's cessation. No discussion of impact of stigmatization on self-report results.</p> <p>Evidence gaps and/or recommendation s for future research: Media campaigns should be made in conjunction with other community based health initiatives.</p> <p>Sources of funding: Not reported – appears to be</p>
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Authors: deVries, Hein; Bakker, Martijntje; Muller, Patricia Dolan; Van Breukelen, Gerard	Source population: Netherlands	Method of allocation: Dice (random) with geographic and urbanization matching	Primary outcomes: 38% of treatment group reported quit attempt (23% in control). 7 days abstinence for 21% of treatment (12% control), for all, p<0.01. No change in partner smoking.	Primary outcomes: Significant increase in quit attempts and 7 day abstinence for women. No difference in partner smoking.	government. Limitations identified by author: No pre-test assessment of attitudes. Only 4 of 12 provinces used in study. Low participation rate of practices. Women's self report and partner report.
Year: 2008	Eligible population: Women in practices involved in the study	Intervention description: persuasion communication model	Secondary outcomes:	Secondary outcomes:	
Citation: Patient Education and Counseling 63, 177-187	Selected population: Self-reported smokers, minimum 1 cigarette per day	For women: video, booklet, 10 minute counseling during visits For partner: booklet	Follow-up periods: 6 weeks post- partum	Attrition details: Treatment: 21 Control: 23 Dropouts treated as smokers. Dropouts analyzed with no differences between groups found	Limitations identified by review team: Partner smoking analysis limited as intervention for partner low: 76.2% of women delivered booklet, and only 48.5% report reading, so approximately 53 of men exposed to treatment. 6 weeks
Aim of study: Determine effectiveness of health counseling method	Excluded population: More than 2 pregnancies Non-Dutch speaking	Control/comparison description: Control received "routine care" not described Sample sizes: Total n=318	Method of analysis: Odds ratios Multivariate analysis Regression analysis		
Study design: cluster randomized control trial	Setting: intervention: office visit Research:	Intervention n=141 Control n=171			
Quality score:+		Baseline			
External validity					

score:  
EV –  
Low partner  
participation, and  
multiparius >2  
excluded

telephone  
interview with  
woman

comparisons: NA  
Abstinence study  
  
Study sufficiently  
powered? Yes  
80% power =304

postpartum does  
not allow for  
relapse.

Evidence gaps  
and/or  
recommendation  
s for future  
research: Need  
to implement  
program to all  
requires training  
midwives.  
Intervention  
could be  
strengthened.  
Partner  
intervention  
needs to be  
designed.

Sources of  
funding:  
NGO Dutch  
cancer society  
and Dutch Heart  
Foundation and  
“Prevention  
Fund”

Authors: Eurenius, Karin; Axelsson, Ove; Sjoden, Per-Olow	Source population: Sweden	Method of allocation: Unselective consecutive	Primary outcomes: No change in intention to quit.	Primary outcomes: routine ultrasound	Limitations identified by author: Bias of participants to give "correct" answer.
Year: 1996	Eligible population:	patients in routine prenatal care, part of larger survey of ultrasound use	Secondary outcomes:	does not influence parents to quit smoking	
Citation: Gynecol Obstet Invest 42, 73-76	Selected population:	Intervention description: Routine second trimester ultrasound viewed by parents separately	Follow-up periods: 1 day	Secondary outcomes:	Limitations identified by review team: All self report of intention, yet still no significant difference.
Aim of study: Does ultrasound screening in second trimester encourage intention to quit in women and partners?	Excluded population: Non-Swedish speaking	Control/comparison description: NA	Method of analysis: Probability of quitting	Attrition details: 9% women and 11% men did not complete second questionnaire – not checked for significance	Almost no analysis of results. Recommendation s not connected to study results.
Study design: Before and after	Setting: clinic				Evidence gaps and/or recommendation s for future research: second scan at 32 weeks for fetal growth may be part of antismoking
Quality score:-		Sample sizes: Total n= 63 women, 53 men Intervention n= Control n=			
External validity score: EV- Nonrandom selection, no control used, 1 day follow-up		Baseline			

		comparisons:NA			program.
		Study sufficiently powered? Not calculated			Sources of funding: grant "gavleborgs las landstngs forskningfond"
Authors: Loke, Alice Yuen; Lam, Tai Hing	Source population: women in first prenatal visit at health care centre in Guangzhou, China	Method of allocation: Randomized envelope	Primary outcomes: Quit attempt: 30% intervention vs. 22.2% control (p=.003). Smoking reduction: 39.7% vs. 17.7% (p=.02). 7 day quit: 8.4% vs. 4.8% (p=.04) 30 day quit: 6.1% vs. 4.2% not significant (p=0.26)	Primary outcomes: Intervention said to improve number of quit attempts, reduce smoking, and 7 day quit. 30 day quit rates not impacted significantly.	Limitations identified by author: Cross-contamination because both control and intervention in same clinic at same time. Lack of validation of husband's smoking status. Possible over report of quit and reduction attempts.
Year: 2005	Eligible population: non-smoking women living with smoking partner	Intervention description: 1. brief scripted advice given by obgyn to woman.		Attrition details: No refusal on participation.	
Citation: Patient Education and Counseling, 59, 31-37.	Selected population: Excluded population: illiterate,	2. booklet of strategies for encouraging husband to quit. 3. reminders to use advice			Limitations identified by review team: Illiterate
Aim of study: Investigate effectiveness of brief advise on quit/ reduction of partner smoking given to wives					
Study design: Randomized control trial					

<p>Quality score: -</p> <p>External validity score:</p> <p>EV- illiterate excluded, a significant population in China; possible cross contamination; wife report of partner smoking behaviour; possible power dynamics impacting reports</p>	<p>pregnancies at risk</p> <p>Setting: obgyn office</p>	<p>given at follow-up visits</p>	<p>excluded, but no data on number of exclusions or level of illiteracy in population.</p> <p>False reports due to wife report of husband's behaviour very possible to show compliance with doctor's instructions.</p> <p>Reduction and 7 day quit very close to cut off p value, so false reports could have made false significance.</p> <p>Lack of attrition and no refusals to participate may show power/authority dynamics.</p> <p>Evidence gaps and/or recommendations for future</p>
		<p>Control/comparison description:</p> <p>Control got standard care - none</p>	
		<p>Sample sizes:</p> <p>Total n= 758</p> <p>Intervention n= 380</p> <p>Control n= 378</p>	
		<p>Baseline comparisons: not made</p>	
		<p>Study sufficiently powered?</p> <p>Yes – 90% power calculated at 334 subjects</p>	



research:  
 Women should  
 be encouraged to  
 request  
 husbands to quit,  
 but the  
 intervention is too  
 brief.

Sources of  
 funding:  
 University of  
 Hong Kong and  
 Hong Kong  
 Polytechnic  
 University.

<p>McBride, Colleen M.;          Baucom, Donald H.;          Peterson, Bercedis L.;          Pollak, Kathryn I.;          Palmer, Carleton;          Westman, Eric;          Lyna, Pauline</p>	<p>Source population:          US military</p> <p>Eligible population: all women at first prenatal visit 1996-2001</p> <p>Selected population:          &lt;20 weeks</p>	<p>Method of allocation:          Stratified for smoking status, partner smoking status, and partner "willingness", and then randomized</p> <p>Intervention description:          Women only intervention (WO):</p>	<p>Primary outcomes:          Self-report 7 day quit for each of 4 times.          Sustained abstinence:          15 of 198 in UC, 20 of 192 in WO, and 21 in PA.          No significant differences in abstinence for pregnant women.</p>	<p>Primary outcomes:          No significant difference in abstinence between the treatment and control groups for pregnant women.          In late pregnancy,</p>	<p>Limitations identified by author:          Self report.  <u>Inclusion of early quitters may have increased quit rates.</u>          Intervention dose may be inadequate.          Limitations</p>
<p>Year: 2004</p>					

Citation: Am J Prev Med 27 (3),	pregnant, aged >= 18 years, married, Current smokers and those who quit <30 days.	Usual care (below) plus 6 counseling calls by MA level healthcare provider, and a late pregnancy relapse prevention kit of booklet and gift.	In late pregnancy, more partners in the PA condition were abstinent (15%) than in the UC condition (5%), p=0.02	more partners were abstinent in the partner-assisted intervention than in the control group.	identified by review team: Very low SES and education levels of population. High drop out rate significant for low SES and education. Low initial participation rate.
Aim of study: Compare intervention that is woman only to partner based.	Consented for partner to be contacted.	Partner Assisted (PA): all WO plus partner booklet and video. Partner received 6 calls. Partner given guides and free nicotine patches if requested.	Secondary outcomes:	Secondary outcomes: Saliva tests made, but results not reported	
Study design: cluster randomized control trial	Excluded population: Non-responders and nonsmokers (55%) - 84% non-response rate	Control/comparison description: Usual Care (UC), provider recommendation for cessation, mail out self-help guide.	Follow-up periods: Telephone contact at 28 weeks pregnancy, and 2,6, and 12 months postpartum	Attrition details: 28 – 50 respondents lost at any follow-up period. Attrition had significant loss of low education and low income respondents.	Evidence gaps and/or recommendations for future research: Partner assisted interventions need to be improved. Influencing young couples may require more intensive counseling. Partners need more support.
Quality score:+	Setting: US military hospital		Method of analysis: ITT, non-responders rated as smokers		
External validity score: EV- Early quitters included; low initial participation acceptance; high drop out of low SES and education participants. No report of partner NRT use.		Sample sizes: Total n=583 Intervention n= WO = 192 PA = 193			Sources of

Control n=198  
63% of eligible  
participated

funding:  
National Cancer  
Institute

Baseline  
comparisons:

Study sufficiently  
powered? Not  
calculated

Authors: Oien, Torbjorn; Storro, Ola; Jenssen, Jon A.; Jonsen, Roar	Source population: all pregnant couples in Norway capital	Method of allocation: control cohort selected 2 years before intervention cohort, stratified for smoking status, sequential cohorts	Primary outcomes: Smoking at 6 weeks postpartum	Primary outcomes: no impact found for intervention for either women or partners	Limitations identified by author: spontaneous quit at pregnancy may leave only "hard core" smokers for intervention.
Year: 2008	Eligible population: all couples at first prenatal visit	Intervention description: brief office intervention using US practice guideline "Treating Tobacco Use and Dependence. Clinical Practice Guideline"	Follow-up periods: 6 weeks postpartum	Attrition details: 54% completed follow up questionnaire. Did non-responder study of 391 parents –	Confounding results in one area explained by prior health campaign.
Citation: BMC Public Health 8 (325).	Selected population: All eligible.		Method of analysis: Chi square, t-test, estimate adjusted odds ratios, binary logistic regression		Limitations identified by review team:
Aim of study: Does prenatal smoking cessation program parental smoking?					
Study design:	Excluded				

<p>Before and after – part of a larger study on parental health behaviours: PACT study,</p> <p>Quality score: -</p> <p>External validity score: EV – Partner participation not reported.</p>	<p>population: non-Norwegian speaking Setting: clinic</p> <p>Control/comparison description: cohort 2 years prior to nationwide program</p> <p>Sample sizes: Total n= Intervention n=2051 baseline, 1109 follow up Control n=1788 at baseline, 1023 at follow up</p> <p>Baseline comparisons: 44% consent</p> <p>Study sufficiently powered? Not calculated</p>	<p>found no bias.</p> <p>Women were “invited” to have partner participate, but no indication of number who actually did so. Self report and women’s report of partner smoking.</p> <p>Evidence gaps and/or recommendations for future research: None discussed</p> <p>Sources of funding: Norwegian Department of Health and Social Affairs; AstaZeneca Norway; Norwegian Research Council; Norwegian</p>
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Medican  
 Association;  
 SINTEF Unimed;  
 Norwegian  
 University of  
 Science and  
 Technology

<p>Authors:          Stanton, Warren R.;          Lowe, John B.;          Moffatt, Jenny;          Del Mar, Chris B.</p> <p>Year: 2004</p> <p>Citation:          Preventative          Medicine 38, 6-9</p> <p>Aim of study: Does          an easily          implemented          intervention result          in improved quit          rates for low SES          men with pregnant          partners?</p>	<p>Source          population:          partners of          pregnant          women at          antenatal          hospital in          Brisbane,          AUS</p> <p>Eligible          population:          Men          nominated by          their partners,          woman &lt;25          weeks          pregnant,          smoking          minimum of          10</p>	<p>Method of          allocation:          After being          stratified for          women's smoking          status, randomized          allocation</p> <p>Intervention          description:</p> <ol style="list-style-type: none"> <li>1. Telephone              interview              with GP              followed by              letter for              their GP</li> <li>2. After              interview,              mailed              video by              male</li> </ol>	<p>Primary outcomes:          Self reported quit          verified by sub          sample of carbon          monoxide testing in          home. Refusal to          test classified as          smokers.</p> <p>Secondary          outcomes:</p> <p>Follow-up periods:          6 months after          baseline interview,          appears that this          was pre-birth.</p>	<p>Primary          outcomes:          Intervention          group self          report quit          rate 16.5% as          compared to          control group          rate of 9.3%          (p=0.011).          45 of 73          quitters          verified by in          home carbon          monoxide          test. Verified          95.8% of          intervention          quitters and          66.7% of          control</p>	<p>Limitations          identified by          author:          Possible bias in          participants from          2 step          recruitment          process.          High false self          report of quit for          control group.          Potential for          postpartum          relapse.</p> <p>Limitations          identified by          review team:          High refusal rate          may have</p>
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Study design: Randomized control trial	cigarettes/day	sports figure on harms of passive smoking AND	Method of analysis: Intention to treat analysis, chi- square, multivariate logistic regression, and attrition analysis	quitters. .	eliminated "hard core" smokers and biased sample towards those with intention to quit.
Quality score:++	Selected population: men meeting criteria and consenting to study, low SES as shown by 46% in unskilled and 40% semiskilled occupation	3. 1 week of free nicotine patches with prescription for 3 week dosage 4. cassette tape and booklet on quitting		Secondary outcomes: NNT 13-14 to 1 Factors significantly associated with quitting: semiskilled occupation, more quit attempts of 2 weeks + duration in past year, and longer time to first cigarette.	Actual effectiveness of intervention may have been higher due to false quit reports in control. No report of number of participants actually viewing video or using patch. No report of control group participants who may have accessed a cessation program outside of the study.
External validity score:+ 2 step recruitment processes with high refusal rate may have biased study. No report of NRT use.	Excluded population: 24.3% of eligible refused to participate	Then 1 week later and one month later mailed 5. reminder and motivation al newsletter		Attrition details: follow-up rate 90%. Those lost to study classified as smokers	Letter for participant's GP may have elicited further support.
	Setting: telephone interview, in home self- administered intervention	Control/comparison description: Control sent brochure with			

contact information on cessation treatment options.

Sample sizes:  
Total n=505  
Intervention n=291  
Control n=270

Baseline comparisons: controlled for women's smoking status.  
Adjustments found no difference in quit rates.

Study sufficiently powered? Yes.  
Alpha of 0.05 enabled detection of 10% difference with more than 90% power.

Evidence gaps and/or recommendations for future research: free patches may be significant factor in intervention success.  
Intervention designed to be used in routine care.

Sources of funding:  
Queensland Health

Authors: Wakefield, Melanie; Jones, Warren

Source population: public women

Method of allocation: Historical – control

Primary outcomes: No significant changes in

Primary outcomes: no

Limitations identified by author:

Year: 1998	patients Australia	group completed survey before intervention group tested.	quit/reduction for either partner.	significant changes in quit and reduction rates at 6 months postpartum	Excluded GP treatment patients – 36.4% of ineligible. “Postpartum component was poorly implemented.” Low participation rate.
Citation: Aust N Z J Public Health 22, 313-320	Eligible population: 62% consent for study	Intervention description: Midwife made demonstration to women of elevation in fetal heart rate from smoking, and given booklet for partner.	Secondary outcomes:  Follow-up periods: Mailed questionnaire to women at 24-26 weeks, 32-34 weeks, and 6 months postpartum. Men’s behaviour by partner report.	Secondary outcomes: 34% of partners in intervention made quit attempt during pregnancy vs. 14.9% of control group, but no significant changes at final measurement	Limitations identified by review team: Study conducted 1991-1993, less awareness of smoking harms. Very low participation rate and high drop out rate. Partner report a significant limitation: women in intervention group most likely to have over reported quit attempts to comply with
Aim of study: Can noel intervention with women and booklet for partner result in improved smoking cessation/ reduction?	Selected population:  Excluded population: smoking less than 1 cigarette/day, received care from GP, history of mental illness, non- English speaking, >20 weeks gestation	Control/comparison description: Usual care -  Sample sizes: Total n= Intervention n=110 Control n=110	Method of analysis: chi-square, logistic regression analysis, odds ratios, 95% confidence intervals, t-tests. Analysis included only those who responded at follow-up.	Attrition details: Very high – by final follow up at 6 months post	
Study design: before and after					
Quality score: + External validity score: EV- Exclusion of GP patients, low participation rate, and high drop out rate.					
	Setting: routine office visit	Baseline comparisons: no significant differences			



Study sufficiently powered? 90% and alpha=0.05 results in sample size of 108. One group dropped below this threshold to 103 participants, impacting power calculation

partum, only 47.3% of control and 60.9% of intervention group completed follow-up.

program. No estimates made of number of partners reading booklet.

Evidence gaps and/or recommendations for future research: interventions must be minimal based on patient care loads and economic considerations.

Sources of funding:  
Research into Drug Abuse  
Grants of Commonwealth  
Dept of Health

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## Appendix A: Rated Intervention Studies:

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## Appendix B: Excluded Studies—did not include an intervention

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## Appendix C: Excluded Studies—did not include partners

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## **Appendix D: Review Team**

Karin (Renee) O’Leary is a Research Assistant at the British Columbia Centre of Excellence for Women’s Health (BCCEWH). She is completing her MA in Sociology with a thesis on the structure of the tobacco industry and state actions for tobacco control, and has written eight academic papers on tobacco control. She has a strong background in the social determinants of health, and in addition has worked as a healthcare provider. She compiled a list of tobacco programs for youth as a Social Science Researcher with the Nursing and Health Behaviour Research Unit of the University of British Columbia in 2008. Over the past three years she has advocated for Aboriginal tobacco issues as a member of the Networked Environments for Aboriginal Research. She has been a member of Globalink since 2005.

Katharine Chan is a Research Assistant at the British Columbia Centre of Excellence for Women’s Health (BCCEWH). She is currently completing her MSc in Biomedical Physiology and Kinesiology. She has co-written abstracts for presentations at both national and international conferences for her research on mapping and contextualizing public sex work spaces and their relationship to HIV prevention. Working for the MAKKA Project, she published articles on the Simon Fraser University Online Community website describing her experiences working in Vancouver’s Downtown Eastside. While working for the BC Centre for Excellence in HIV/AIDS, she compiled mapping data to better understand the needs of survival sex workers involving harm reduction, referrals, supplies and resources.

Natalie Hemsing, MA is the Tobacco Research Program Coordinator at the British Columbia Centre of Excellence for Women’s Health (BCCEWH). In this role, she is involved in multiple projects on: smoking cessation during pregnancy, sex, gender, diversity and tobacco use and/ or policies, tobacco use among Aboriginal girls and boys, and the prevention of uptake among youth. She also

has experience working on other literature reviews in the field of health promotion, including: evidence reviews on women's respiratory and cardiovascular health, and a literature review on the social determinants of women's physical activity.

Dr Lorraine Greaves, PhD is an Investigator at the British Columbia Centre of Excellence for Women's Health (BCCEWH). She specializes in women's health and gender based research, the translation of health research into enhanced policies, programs and clinical practices, tobacco use and other addictions, and better practices development in tobacco cessation and policy. She has over 20 years of experience in tobacco research, specifically addressing inequities in the effects of tobacco initiatives and policies, and creating knowledge products in women's health.

Dr Chizimuzo Okoli, PhD is an Investigator at the BCCEWH. His research has centered on the psychosocial and environmental factors influencing tobacco use behaviours, as well as the physical and behavioural health effects of second hand tobacco smoke exposure. Dr. Okoli's research interests include understanding the relationship between secondhand smoke exposure and tobacco use, and policies and practices which promote tobacco use cessation and reduce the harm associated with tobacco smoke exposure. More recently, his research has incorporated gender-based analysis, particularly in the area of understanding the social and environmental contexts of girls and women's tobacco use.

None of the authors have any potential conflict of interest.



## Appendix E: Quality Appraisal of Intervention Studies

<b>Quality Appraisal of Intervention Studies<sup>1</sup></b> ++ = good, + = mixed, - = poor, nr = not reported, na = not applicable  Cells are colour-coded to demonstrate the relationship with the summary questions below.			
<b>Study identification</b> <i>(include full citation details)</i>			
<b>Study design:</b>			
<b>Evaluation criteria</b>		<b>Quality</b> ++ + - nr na	<b>Guidance topic:</b>
		<b>Assessed by:</b>	
<b>Population</b>	<b>Section 1: Population</b>		
	<b>1.1</b> Is the source population or source area well described?		
	<b>1.2</b> Is the eligible population or area representative of the source population or area?		
	<b>1.3</b> Do the selected participants or areas represent the eligible population or area?		
<b>Intervention (&amp; Comparison)</b>	<b>Section 2: Method of allocation to intervention (or comparison)</b>		
	<b>2.1</b> Allocation to intervention (or comparison). How was selection bias minimised?		
	<b>2.2</b> Were interventions (and comparisons) well described and appropriate?		
	<b>2.3</b> Was the allocation concealed?		
	<b>2.4</b> Were participants and/or investigators blind to exposure and comparison?		

	2.5 Was the exposure to intervention and comparison adequate?		
	2.6 Was contamination acceptably low?		
	2.7 Were the other interventions similar in both groups?		
	2.8 Were all participants accounted for at study conclusion?		
	2.10 Did the setting reflect usual UK practice?		
	2.11 Did the intervention or control comparison reflect usual practice?		

<b>Section 3: Outcomes</b>			
Outcomes	3.1 Were outcome measures reliable?		
	3.2 Were all outcome measurement complete?		
	3.3 Were all important outcomes assessed?		
	3.4 Were outcomes relevant?		
Time	3.5 Were there similar follow-up times in exposure and comparison groups?		
	3.6 Was follow-up time meaningful?		

<b>Section 4: Analyses</b>			
Results	4.1 Were exposure and comparison groups similar at baseline? If not, were these adjusted?		
	4.2 Was intention to treat (ITT) analysis conducted?		
	4.3 Was the study sufficiently powered to detect an intervention effect (if one exists)?		
	4.4 Were the estimates of effect size given or calculable?		

	4.5 Were the analytical methods appropriate?		
	4.6 Was the precision of intervention effects given or calculable? Were they meaningful?		

<b>Summary</b>	<b>Section 5: Summary</b>		
	5.1 Are the study results internally valid (i.e unbiased)?		
	5.2 Are the findings generalisable to the source population (i.e externally valid)?		

<sup>1</sup>Appraisal form derived from 'The GATE frame: critical appraisal with pictures' by Jackson, R. et al., Evid Based Med. 2006 Apr;11(2):35-8.

## Appendix F: Data extraction form

SECTION 3: DESCRIPTION OF THE STUDY (The following information is required to complete evidence tables fac comparisons. Please complete all sections for which information is available) <i>PLEASE PRINT CLEARLY</i>	
Authors/ Title/ Source:	
Data Extracted by:	Date Extracted:
1	Type of study, and study rating?
2	Country where the research was conducted?
3	What was the research question?
4	How many patients are included in this study? <i>Please indicate number in each control and treatment of the study, at the time the study began.</i>
5	What are the main characteristics of the patient population? <i>(Include all relevant characteristics – for example, age, sex, ethnic origin, comorbidity, disease status)</i>
6	Description of the intervention. What intervention (treatment, procedure) is being investigated in this study? <i>List all interventions covered by the study.</i>
7	Description of the comparators. What comparisons are made in the study? <i>Are comparisons made between treatments, or between treatment and placebo/no treatment?</i>
8	Length of the intervention
9	Follow up: number of sessions and time of follow-up? <i>Length of time patients are followed from beginning participation in the study.</i>
10	Providers/ deliverers of the intervention ( <i>researcher, nurse, physician, etc</i> )?
11	When is the final measurement conducted ( <i>e.g. # weeks postpartum, etc</i> )?
12	What outcome measure(s) are used in the study? <i>List all outcomes that are used to assess effectiveness of the interventions used. (i.e. self-reported smoking behaviour, objective measures of smoking, self-reported changes in attitudes towards smoking following the intervention)</i>
13	What size of effect is identified in the study? <i>List all measures of effect in the units used in the study – for example, absolute or relative risk, number needed to treat. Include p values and any confidence intervals that are provided.</i>
14	Statistically significant rates of cessation or reduction of smoking ( <i>% of cessation or of reduction for each treatment and control groups</i> )
15	How was this study funded? <i>List all sources of funding quoted in the article, whether Government, voluntary sector or industry.</i>
16	Does the intervention address any of the following sub-populations: aged 20 or younger, in routine or manual occupations, lone parents, unemployed, black or ethnic minority, looked after in a care setting, refugees and asylum seekers?
17	Does this study help to answer one or more of your key questions and sub-questions (i-vi in scope)? <i>Summarise the main conclusions of the study and indicate to which key questions it relates and how it relates to these questions.</i>
18	Do the authors identify any strengths and/or weaknesses of the evidence presented?
19	Are there effective practice or policy implications of the work?

## Appendix G: Search Strategy

Ovid MEDLINE(R) 1950 to May Week 2 2009

Searched 14 May 2009 by Daniel Tuvey

1	(smok\$ or nicotin\$ or tobacco or cigar\$ or hand-roll\$ or bidi or paan or gutkha or snuff or beetle nut\$ or betel).ti,ab.	191612
2	Nicotine/	17249
3	Tobacco/	17883
4	"Tobacco Use Disorder"/	5252
5	Tobacco, Smokeless/	2125
6	Tobacco Smoke Pollution/	7289
7	Smoking/	92105
8	or/1-7	220140
9	cessation.ti,ab.	36992
10	(withdraw\$ or quit\$ or stop\$ or prevent\$ or abstain\$ or discourag\$).ti,ab.	837609
11	Smoking Cessation/	13197
12	"Tobacco Use Cessation"/	417
13	Smoking/pc [Prevention & Control]	11738
14	or/9-13	872058
15	8 and 14	47247
16	pregnan\$.ti,ab.	281613
17	(ante natal or ante-natal or post natal or post-natal or pre natal or pre-natal or puerperium).ti,ab.	8650
18	(post partum or postpartum or post-partum).ti,ab.	29594
19	Pregnancy/	592496
20	Postpartum Period/	13961
21	Postnatal Care/	2909
22	Pregnant Women/	4281
23	Prenatal Care/	16122
24	or/16-23	654196
25	(husband\$ or wife\$ or partner\$ or boyfriend\$ or girlfriend\$ or spouse\$ or fiance\$ or significant other\$ or famil\$ or cohabit\$).ti,ab.	590966
26	Spouses/	4415
27	Sexual Partners/	5862
28	Family/	50237
29	or/25-28	614048
30	15 and 24 and 29	532
31	Animals/	4376598
32	Humans/	10710467
33	31 not (31 and 32)	3278689
34	30 not 33	530

35 limit 34 to english language 468  
36 limit 35 to yr="1990 - 2009" 420

EMBASE 1988 to 2009 Week 19

Searched 14 May 2009 by Daniel Tuvey

1	(smok\$ or nicotin\$ or tobacco or cigar\$ or hand-roll\$ or bidi or paan or gutkha or snuff or beetle nut\$ or betel).ti,ab.	133015
2	Nicotine/	17718
3	Tobacco/	10594
4	Tobacco Dependence/	4778
5	Smokeless Tobacco/	885
6	Smoking/	50233
7	Cigarette Smoking/	32491
8	Smoking Habit/	8081
9	Maternal Smoking/	649
10	Tobacco Smoke/	4352
11	or/1-10	158107
12	cessation.ti,ab.	26771
13	(withdraw\$ or quit\$ or stop\$ or prevent\$ or abstain\$ or discourag\$).ti,ab.	608913
14	Smoking Cessation/	17379
15	Smoking/pc [Prevention]	5
16	or/12-15	632492
17	11 and 16	34770
18	pregnan\$.ti,ab.	161375
19	(ante natal or ante-natal or post natal or post-natal or pre natal or pre-natal or puerperium).ti,ab.	4278
20	(post partum or postpartum or post-partum).ti,ab.	16817
21	Pregnancy/	98672
22	Puerperium/	9117
23	Postnatal Care/	1328
24	Pregnant Woman/	4951
25	Prenatal Care/	9015
26	or/18-25	205593
27	(husband\$ or wife\$ or partner\$ or boyfriend\$ or girlfriend\$ or spouse\$ or fiance\$ or significant other\$ or famil\$ or cohabit\$).ti,ab.	419392
28	Spouse/	3295
29	Family/	28449
30	or/27-29	425651
31	17 and 26 and 30	369
32	Animal/	9049
33	Human/	5686643

34	32 not (32 and 33)	7000
35	31 not 34	369
36	limit 35 to english language	328
37	limit 36 to yr="1990 - 2009"	321

## PsycINFO 1987 to May Week 2 2009

Searched 14 May 2009 by Daniel Tuvey

1	(smok\$ or nicotin\$ or tobacco or cigar\$ or hand-roll\$ or bidi or paan or gutkha or snuff or beetle nut\$ or betel).ti,ab.	27644
2	Nicotine/	5106
3	Tobacco Smoking/	13413
4	Smokeless Tobacco/	356
5	or/1-4	27792
6	cessation.ti,ab.	7291
7	(withdraw\$ or quit\$ or stop\$ or prevent\$ or abstain\$ or discourag\$).ti,ab.	113665
8	smoking cessation/	5817
9	Nicotine Withdrawal/	379
10	or/6-9	117733
11	5 and 10	11642
12	pregnan\$.ti,ab.	16447
13	(ante natal or ante-natal or post natal or post-natal or pre natal or pre-natal or puerperium).ti,ab.	492
14	(post partum or postpartum or post-partum).ti,ab.	4183
15	Pregnancy/	7556
16	Postnatal Period/	2266
17	Expectant Mothers/	391
18	Prenatal Care/	817
19	or/12-18	21317
20	(husband\$ or wife\$ or partner\$ or boyfriend\$ or girlfriend\$ or spouse\$ or fiance\$ or significant other\$ or famil\$ or cohabit\$).ti,ab.	212764
21	Spouses/	6060
22	Husbands/	1218
23	Wives/	1848
24	Sexual Partners/	1369
25	Significant Others/	925
26	Family/	17523
27	or/20-26	215021
28	11 and 19 and 27	147
29	limit 28 to english language	146
30	limit 29 to yr="1990 - 2009"	145
31	from 30 keep 1-145	145



Cinahl – 1981 – Date

Searched 14 May 2009 by Daniel Tuvey

1	CINAHL (smok* OR nicotin* OR tobacco OR cigar* OR hand-roll* OR bidi OR paan OR gutkha OR snuff OR beetle AND nut* OR betel).ti,ab	<a href="#">25662</a>
2	CINAHL NICOTINE/	<a href="#">1104</a>
3	CINAHL TOBACCO/	<a href="#">1977</a>
4	CINAHL "TOBACCO ABUSE (SABA CCC)"/	<a href="#">1</a>
5	CINAHL TOBACCO, SMOKELESS/	<a href="#">440</a>
6	CINAHL SMOKING/	<a href="#">16690</a>
7	CINAHL 1 OR 2 OR 3 OR 4 OR 5 OR 6	<a href="#">30616</a>
8	CINAHL cessation.ti,ab	<a href="#">5530</a>
9	CINAHL (withdraw* OR quit* OR stop* OR prevent* OR abstain* OR discourag*).ti,ab	<a href="#">10164</a>
10	CINAHL SMOKING CESSATION/	<a href="#">4</a>
11	CINAHL "TOBACCO ABUSE CONTROL (SABA CCC)"/	<a href="#">5927</a>
12	CINAHL SMOKING/PC [PC=Prevention And Control]	<a href="#">1</a>
13	CINAHL 8 OR 9 OR 10 OR 11 OR 12	<a href="#">2977</a>
14	CINAHL 7 AND 13	<a href="#">10837</a>
15	CINAHL pregnan*.ti,ab	<a href="#">2</a>
16	CINAHL (ante AND natal OR ante-natal OR post AND natal OR post-natal OR pre AND natal OR pre-natal OR puerperium).ti,ab	<a href="#">11916</a>
17	CINAHL (post AND partum OR postpartum OR post-partum).ti,ab	<a href="#">26905</a>
18	CINAHL PREGNANCY/	<a href="#">443</a>
19	CINAHL "POSTPARTUM (OMAHA)"/	<a href="#">4692</a>
20	CINAHL POSTNATAL CARE/	<a href="#">61064</a>
21	CINAHL POSTNATAL PERIOD/	<a href="#">1</a>
22	CINAHL "POSTPARTUM CARE (SABA CCC)"/	<a href="#">1793</a>
23	CINAHL EXPECTANT MOTHERS/	<a href="#">2102</a>
24	CINAHL PRENATAL CARE/	<a href="#">1</a>
25	CINAHL PUERPERIUM/	<a href="#">1112</a>
26	CINAHL 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25	<a href="#">5433</a>
27	CINAHL (husband* OR wife* OR partner* OR boyfriend* OR girlfriend* OR spouse* OR fiance* OR significant AND other* OR famil* OR cohabit*).ti,ab	<a href="#">288</a>
28	CINAHL SPOUSES/	<a href="#">68881</a>
29	CINAHL SEXUAL PARTNERS/	<a href="#">93546</a>
30	CINAHL FAMILY/	<a href="#">3375</a>
31	CINAHL 27 OR 28 OR 29 OR 30	<a href="#">2105</a>
32	CINAHL 14 AND 26 AND 31	<a href="#">13533</a>
33	CINAHL 32 [Limit to: Publication Year 1990-2009 and (Language English)]	<a href="#">10030</a>

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Searched 14 May 2009 by Daniel Tuvey

1	<a href="#">smok* OR nicotin* OR tobacco OR cigar* OR hand-roll* OR bidi OR paan OR gutkha OR snuff OR beetle AND nut* OR betel</a>	1064
2	<a href="#">MeSH Nicotine</a>	64
3	<a href="#">MeSH Tobacco</a>	11
4	<a href="#">MeSH Tobacco Use Disorder</a>	59
5	<a href="#">MeSH Tobacco, Smokeless</a>	6
6	<a href="#">MeSH Tobacco Smoke Pollution</a>	21
7	<a href="#">MeSH Smoking</a>	294
8	<a href="#">#1 or #2 or #3 or #4 or #5 or #6 or #7</a>	1123
9	<a href="#">cessation</a>	499
10	<a href="#">withdraw* OR quit* OR stop* OR prevent* OR abstain* OR discourag*</a>	10268
11	<a href="#">MeSH Smoking Cessation</a>	288
12	<a href="#">MeSH Tobacco Use Cessation</a>	9
13	<a href="#">#9 or #10 or #11 or #12</a>	10495
14	<a href="#">##8 AND #13</a>	742
15	<a href="#">pregnan*</a>	2198
16	<a href="#">ante AND natal OR ante-natal OR post AND natal OR post-natal OR pre AND natal OR pre-natal OR puerperium</a>	623
17	<a href="#">post AND partum OR postpartum OR post-partum</a>	260
18	<a href="#">MeSH Pregnancy</a>	1444
19	<a href="#">MeSH Postpartum Period</a>	34
20	<a href="#">MeSH Postnatal Care</a>	59
21	<a href="#">MeSH Pregnant Women</a>	9
24	<a href="#">MeSH Prenatal Care</a>	165
25	<a href="#">#15 or #16 or #17 or 18 or #19 or #20 or #21 or #24</a>	3086
26	<a href="#">husband* OR wife* OR partner* OR boyfriend* OR girlfriend* OR spouse* OR fiance* OR significant AND other* OR famil* OR cohabit*</a>	10492
27	<a href="#">MeSH Spouses</a>	13
28	<a href="#">MeSH Sexual Partners</a>	26

29	<a href="#">MeSH Family</a>	111
30	<a href="#">#26 or #27 or #28 or #29</a>	10542
31	<a href="#">#14 AND #25 AND #30</a>	41
34	<a href="#">#31 RESTRICT YR 1990 2009</a>	41

## **Appendix H: Search protocol**

### **How to stop smoking in pregnancy and following childbirth**

The two questions to be addressed are:

Question 1: Which interventions are effective and cost effective in encouraging partners and significant others to support smoking cessation during pregnancy and following childbirth?

Question 2: Which interventions are effective and cost effective in encouraging partners and significant others who smoke of stop smoking?

The aim of this strategy is to identify evidence to answer the two review questions.

### **Populations**

- Women who smoke who are planning a pregnancy, are pregnant (from conception to birth) or who have an infant aged less than 12 months
- Women who stop smoking immediately prior to or during their pregnancy or soon after childbirth
- Partners and significant others of a woman who is pregnant, planning a pregnancy or has an infant aged less than 12 months (regardless of whether or not the woman smokes)

### **Time limits of search**

The literature search will cover studies published between 1990 and 2009.

### **Databases to be searched**

- Medline
- Embase
- Cinahl
- PsycINFO

## Smoking cessation – pregnancy and partners (Medline strategy)

Ovid MEDLINE(R) 1950 to May Week 2 2009

Searched 14 May 2009 by Daniel Tuvey

1	(smok\$ or nicotin\$ or tobacco or cigar\$ or hand-roll\$ or bidi or paan or gutkha or snuff or beetle nut\$ or betel).ti,ab.	191612
2	Nicotine/	17249
3	Tobacco/	17883
4	"Tobacco Use Disorder"/	5252
5	Tobacco, Smokeless/	2125
6	Tobacco Smoke Pollution/	7289
7	Smoking/	92105
8	or/1-7	220140
9	cessation.ti,ab.	36992
10	(withdraw\$ or quit\$ or stop\$ or prevent\$ or abstain\$ or discourag\$).ti,ab.	837609
11	Smoking Cessation/	13197
12	"Tobacco Use Cessation"/	417
13	Smoking/pc [Prevention & Control]	11738
14	or/9-13	872058
15	8 and 14	47247
16	pregnan\$.ti,ab.	281613
17	(ante natal or ante-natal or post natal or post-natal or pre natal or pre-natal or puerperium).ti,ab.	8650
18	(post partum or postpartum or post-partum).ti,ab.	29594
19	Pregnancy/	592496
20	Postpartum Period/	13961
21	Postnatal Care/	2909
22	Pregnant Women/	4281
23	Prenatal Care/	16122
24	or/16-23	654196
25	(husband\$ or wife\$ or partner\$ or boyfriend\$ or girlfriend\$ or spouse\$ or fiance\$ or significant other\$ or famil\$ or cohabit\$).ti,ab.	590966
26	Spouses/	4415
27	Sexual Partners/	5862
28	Family/	50237
29	or/25-28	614048
30	15 and 24 and 29	532
31	Animals/	4376598
32	Humans/	10710467
33	31 not (31 and 32)	3278689

34	30 not 33	530
35	limit 34 to english language	468
36	limit 35 to yr="1990 - 2009"	420







